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ABSTRACT

These proceedings are divided into three parts. The first part provides a general summary of the discussions under the headings of scope of distance education and nonformal, formal, and continuing education; cost-effectiveness; technology; instructional materials; recognition and status; planning and management; training; international cooperation; suggestions for further studies in the region; and recommendations. The following seminar papers are included in the second part: "Issues in Distance Education" (Motilal Sharma); "Growth and Scope of Distance Learning" (Ralph Smith); "Distance Education in Asia and the Pacific" (Mohammad Selim); "Application of Distance Education in Formal and Non-Formal Education" (James Taylor); "Planning, Management, and Monitoring of Distance Education" (G. Ram Reddy); "Hardware and Software in Distance Education" (Takashi Sakamoto); "Satellite Applications in Distance Education through TV and Radio" (Mohan Sundara Rajan); and "Financing and Cost-Effectiveness of Distance Education" (Wichit Srisa-an). Lists of seminar recommendations and participants conclude the volume. (MN)

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Distance Education in Asia and the Pacific
Volume I

ED290863

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PROCEEDINGS OF THE REGIONAL SEMINAR
ON DISTANCE EDUCATION

26 November – 3 December 1986
Bangkok, Thailand

ASIAN DEVELOPMENT BANK
Manila

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FOREWORD

The countries of Asia and the Pacific are engaged in exploring appropriate ways of tackling the urgent problem of educating their large and growing populations in relatively little time and with limited resources. The pressures on traditional educational institutions are growing, with the result that education is expensive and often inaccessible. Planners in these dynamic countries are therefore attempting to evolve policies which permit, firstly, equitable access to education; secondly, enrichment of the content of formal education to include more applied and employment-related courses; and thirdly, through continuing education, an upgrading of skills and improvement of the quality of life and human resources.

To encourage this amplification to take place, educationists have turned their attention to distance education methods. This is a novel concept which attempts to loosen the confines of traditional teaching requirements and allow larger sections of populations the benefit of education. One of the strategies of distance education is the increased use of communications technology to deliver learning materials to students. Educationists now acknowledge the liberating possibilities of the non-print media which have the potential to surmount physical obstacles as well as break the constraints of traditional classroom teaching. Such methods are altering time-honored concepts in the field of education.

Resistance to conceptual change in education is not inapposite. It introduces a healthy note of caution when even traditional educationists and planners in both industrialized and developing countries find themselves persuaded to support new methods of providing education to far greater numbers than has been possible through conventional methods. Most forcefully persuasive is the undesirable prospect of allowing large populations to remain unskilled and inadequately prepared to participate in important economic programs.

The resource papers presented at the Seminar held in Bangkok from 26 November to 3 December 1986 provide exhaustive information on every aspect of distance education in the Region. They are together, a valuable source of information for those wishing to address the problems of providing large-scale educational opportunities. The summary of the proceedings highlights the many advantages of distance education methods currently followed in the Region, while examining several problems which still have to be solved.

My thanks go to all participants and observers for their valuable contribution to the discussion of the Seminar. Their views and experience *enriched the proceedings. I also extend my thanks to all resource persons, namely, Dr. Ram Reddy, Prof. Takashi Sakamoto, Dr. Mohammad Selim, Prof. Ralph Smith, Mr. Mohan Sundara Rajan and Dr. James Taylor.*

My special thanks go to Their Excellencies, Dr. Subin Pinkayan, Minister of University Affairs, Thailand and Dr. Supachai Panitchpakdi, Deputy Minister of Finance, Thailand, who kindly agreed to address the opening and closing sessions of the Seminar; the staff of Sukhothai Thammathirat Open University and particularly the Rector, Prof. Dr. Wichit Srisa-an who was also a resource person; his colleagues, namely, Dr. Pratya Vesarach, Dr. Iam Chaya-Ngam; and Dr. Tong-In Wangsotorn; and also to Dr. Makaminan Makagiansar, Assistant Director General of UNESCO's Regional Office, Bangkok, for extending their cooperation in making the Seminar possible.

I should also like to thank Dr. Motilal Sharma who doubled as resource person and organizer, Mr. N. R. Collier and Mr. G.H.P.B. van der Linden who closely supervised the organization of the Seminar, Mrs. Cristina Gamboa and Mr. Manuel Perlas for assistance in coping with the numerous administrative matters, Mrs. Lena Acharya, who was the Rapporteur for the Seminar, and the secretarial support staff for their unflagging help before, during and after the Seminar.

S. V. S. JUNEJA
Director
Infrastructure Department

PREFACE

Large increases in population coupled with a growing awareness of the benefits of education are leading governments to explore the possibility of using alternative means to provide education on a large scale, particularly as conventional educational methods are becoming increasingly expensive. One such alternative that countries in the Region are considering is distance education. In the view of the Bank, this was an opportune time to bring together officials of the Bank's developing member countries who are, or are likely to be, involved in distance education operations, along with representatives of institutions which have had substantial experience in this field. Such a gathering, it was hoped, would encourage an exchange of ideas and help develop appropriate policies and project strategies.

The eight-day Seminar on Distance Education was conducted in Bangkok from 26 November to 3 December 1986 at the Sukhothai Thammathirat Open University (STOU). STOU has been designated by UNESCO as a lead institution in Asia and the Pacific and has excellent staff, facilities and experience in hosting such international seminars. The STOU worked in close cooperation with the Bank and UNESCO, Bangkok, in the organization and management of the Seminar. The Seminar was attended by 40 participants from 14 developing member countries (Bhutan, Burma, Fiji, Hong Kong, India, Indonesia, Republic of Korea, Malaysia, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka and Thailand) and three other member countries of the Bank (Australia, Japan and New Zealand). The participants included policymakers and technical experts who have executive or operational responsibility for distance education projects in both formal and non-formal sectors of education, and at all levels of education. During the Seminar, they were able to discuss their experience in distance education, compare strategies for distance education projects, develop models that are likely to be successful in their own environments, and exchange ideas on costs, management and other operational issues. The Seminar also provided an opportunity to Bank staff to become acquainted with this relatively new and rapidly developing field.

Eight resource papers were presented and discussed at plenary sessions in addition to five country case studies. Thirteen country papers were also circulated at the Seminar. These papers were used as reference materials in four workshops, which were charged with discussing detailed agenda relating to many of the issues raised at plenary sessions. The groups returned their considered opinions and findings to be incorporated into the general recommendations adopted at concluding plenary ses-

sions. Briefly, the themes included costs of distance education compared to those of conventional forms, the special organizational and training needs of distance education and the use of mass communications media for educational purposes.

The resource papers are presented in Volume I which also provides a Summary of the Proceedings, the Recommendations and the Resource Papers. Volume II presents the Country Papers and Case Studies. It is hoped that these two volumes will be of interest to those engaged in the task of providing better educational opportunities to the less-privileged.

The Education Division of the Bank takes particular pleasure in presenting this Report. It is hoped that the included Papers and Proceedings will be of value to those engaged in planning and management of distance education in developing countries, as they will, we know, be useful to multilateral and bilateral donors providing assistance to the education sector.

G.H.P.B. van der Linden
Acting Manager
Education Division

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PART I

SUMMARY OF PROCEEDINGS

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INTRODUCTION

A Regional Seminar on Distance Education was convened at Bangkok from 26 November to 3 December 1986 by the Asian Development Bank in collaboration with the Sukhothai Thammathirat Open University (STOU), Thailand, and in cooperation with UNESCO Regional Office, Bangkok.

The Bank has so far concentrated on extending assistance to projects which strengthen the educational infrastructure particularly in technical and vocational fields. Although the Bank has not formally examined innovative methods of transferring knowledge, a professional staff paper on distance education (March 1985) attempted to trace the history and growth of methods of learning or teaching now termed distance education. The paper examined some of the available evidence of the costs of this educational methodology as opposed to conventional educational systems, and marked the Bank's readiness to explore the possibilities of assisting distance education programs in its developing member countries (DMCs). The Seminar was convened as a first step in this direction. One purpose of the Seminar was to collect under the aegis of the Bank as much information as possible, in the form of resource and country papers, on the subject of distance education and how it has developed among its members. The other was to seek to identify, through the discussions and proceedings, the appropriate areas in which the Bank could most effectively assist its DMCs.

The topics examined in some detail by the resource papers highlight important aspects of distance learning methods already in use in the region. Dr. Motilal Sharma's paper, *Issues in Distance Education*, underlined the need for equal educational opportunity to allow widespread participation of people in the development process and examined the possibilities of distance education methods to achieve this objective. The paper outlined some developmental problems in education which are likely to influence educational development in the Region in the coming decade and emphasized the need for developing effective alternative strategies to achieve optimal educational development, as well as enhance the quality, relevance and efficiency of education. It outlined the issues related to planning, management, monitoring and cost-effectiveness of distance education and suggested that there is a need for the analysis of the strategies of various distance education programs to study their cost-effectiveness and to design appropriate alternative systems of distance education. The paper also drew attention to issues related to the costs of electronic media and the quality of mass education programs. Professor Ralph Smith, in his paper

Growth and Scope of Distance Learning, related some of the experiences of distance education planners, the numerous cost-effective ways in which this mode can be applied, its advantages and its drawbacks, and the potential of distance education to respond to new economic challenges and satisfy social needs, a task hitherto assigned to more conventional methods of imparting knowledge. Conventional institutions are now feeling the pressure of demographic and socioeconomic changes, particularly in those subjects where knowledge is changing and expanding rapidly. In this context he drew the attention of the participants to the successful ways in which industry and academia have collaborated to respond to the desire for more employment-oriented courses. Dr. Mohammad Selim, in his paper, examined the status of *Distance Education in Asia and the Pacific* Region. The paper described several of the programs in distance education in the Bank's DMCs and attempted to forecast the direction these activities would take. Dr. Selim highlighted the fact that the Asia and Pacific Region has some of the largest concentrations of young populations in the world. Therefore a great deal of thought would have to be given to the use of distance education for pre-secondary and secondary levels of education as well. He also stressed the need to plan educational strategies very carefully before increasing the base of education. Dr. James Taylor's paper on the *Application of Distance Education in Formal and Non-Formal Education* stressed the need for high quality educational materials if distance education was to make any impact and gain widespread acceptance among students and employers alike. All those involved in the setting up of distance education institutions and the preparation of instructional materials would have to address themselves rigorously to creating high standards. Cost-effectiveness, he emphasized, was attainable through excellent delivery systems but only if the student is assured that the course material is as good, if not better than a conventional lecture. He also examined the possibilities for regional cooperation and collaboration for creating a database and a system by which to avoid unnecessary duplication in the creation of course materials and other distance education efforts. Professor G. Ram Reddy, in his paper, *Planning, Management and Monitoring of Distance Education*, examined the planning methods used by and managerial structures of different types of distance education systems. He emphasized the need for slow and careful steps in preparing the organizational groundwork needed for effective distance education. He pointed out the weaknesses of some institutions in the Region in the hope that future institutions would avoid the pitfalls of hasty and inappropriate decisions. Distance education systems, he warned, are not inexpensive to set up, but they may answer an urgent need, that of educating large populations. Well managed, they could achieve standards equivalent to the traditional educational institutions. Large autonomous distance education systems have complex managerial structures which need extraordinary planning and continued monitoring. Dr. Takashi Sakamoto, in his paper, *Hardware and Software in Distance Education*, reviewed some of the pedagogical capabilities of the electronic media which have been developed in advanced countries and considered those which can be modified, extended and interfaced with other compatible technologies to make distance learning more flexible and responsive to changing needs among less developed countries. He emphasized the need for DMCs to be familiar with the workings of the electronic media in preparation for the imminent technological quantum leap. DMCs will find themselves disadvantaged if they choose to delay joining in with new global technological ventures. Mr. Mohan Sundara Rajan's paper, *Satellite Applications in Distance Education Through TV and Radio*, pursued a similar theme with special reference to the implications, communications possibilities and costs of satellite-based instructional technology. He examined some successful satellite experiments of the Region and elaborated the ways by which other DMCs could make use of this technology. Satellite broadcasting technology has become more flexible and can now cater to specific areas with narrow, high frequency and spot beams, while terrestrial receivers and the ground segment have become less cumbersome. He pointed out that direct broadcast satellites will in time have greater power while the receiving costs will be reduced. Satellites have several applications and can be cost-effective. The paper examined and listed the options now available and detailed some of the technological combinations by which DMCs could decide what was most affordable and appropriate for their needs. The paper emphasized the need for good producers of software as this area often gets less attention while planners concern themselves with obtaining hardware. The last resource paper, presented by Professor Wichit Srisa-an, *Financing and Cost-Effectiveness of Distance Education*, examined the financial implications of setting up and conducting an open university and considered how such an institution fared financially vis-a-vis a conventional university. He compared the costs and patterns of financing in various open and conventional systems, the options and possibilities of financial viability through the low running costs and recovery through charging of school fees, the sale of teaching materials, the offer of training facilities and numerous social benefits. He also discussed the growing need in DMCs for the development of human resources and how distance education methods could be used to meet them effectively and expeditiously.

The resource papers were followed by presentation of country case studies, the countries represented being India, Indonesia, Korea, Pakistan and Thailand, and 12 country papers which detailed the state of distance education and the scope for its expansion in the Region. These are published separately in a companion volume. Four workshops met to discuss issues under several headings such as role, content, clientele, and status of distance education, finance, management, international assistance, staffing, training and technology. The findings at workshops were then drafted into a number of broad recommendations which draw the attention of governments, the Bank and other multilateral agencies (MLAs) and bilateral sources to the needs of DMCs in the field of distance education.

GENERAL SUMMARY OF DISCUSSIONS

A. Scope of Distance Education

A study undertaken in the early 1980s revealed that nearly two million students worldwide, were studying via the distance education mode. Since then, the number is likely to have grown. The number of correspondence schools in the Asia and Pacific Region is also indicative of the extent of the demand for formal education. Demographical studies and the present state of education in Asia are other indicators of the likely expansion. Distance education methods are certainly an appealing alternative for dealing with such a large demand.

The Bank's DMCs have already deployed distance methods for non-formal, secondary and university level education. The scale, while it is poised for a change, has mainly been restricted to the experimental, to educational support and to correspondence courses. Some teacher-training institutions have been using distance methods and a few autonomous institutions including open school and university, have been launched. With an exception or two, there have not been many useful evaluations of their investment costs, running expenses and performance. Midstream evaluation would help to establish the case for distance education in Asia.

Prima facie, the scope for distance education is considerable in the Region as shown by some of the programs. Non-formal education through multimedia efforts has been part of most developmental and extension programs, while correspondence courses have been the main mode of formal distance education at the secondary and tertiary levels. The Seminar examined the scope for extending the distance mode to formal education at all levels but most particularly at tertiary levels and in the area of continuing education.

Although there were some reservations of a pedagogical nature, participants were of the view that most subjects can be delivered through distance methods though there may be a variation in the cost (as for instance in supplying laboratory kits) of science and engineering subjects. There is a perception that the distance mode can be used mainly for humanities and the liberal arts subjects. Distance education methods are likely to be extended, if they aren't already, in most DMCs to include subjects which have a direct bearing on rural development and project management. Similarly, horticulture, animal husbandry and technician courses, for example, would find a place in the curriculum. Apart from the area of rural development, courses related to commerce, industry and entrepreneurship could be successfully delivered. Obviously, distance methods can extend the limits of conventional education, its content and methodology.

A definition of distance education was sought at the first plenary session. The relevance of determining a common understanding became apparent in the course of the Seminar and was taken up at a workshop. A finer analysis revealed that there was at least as much variation in the use and application of the distance learning mode as there are educational requirements in the Region. There was wide agreement that distance education methods, as in correspondence courses and in educational radio programs, have already been in use for well over half a century in the Region and that the time has come to recognize the validity of and need for organizing these methods more specifically for increasing the educational base, particularly as populations in the Region grow and pressure increases for more equitable access to knowledge. Advances in the field of distance education and the techniques of successful communication, whether on a large scale as in an open school and university, or on a smaller, non-formal one as in rural extension programs, must be taken note of and applied as found to be appropriate. The obvious conclusion is that there are several levels of educational requirements and large numbers of people but insufficient teaching organizations. It is perhaps time to examine how best to serve the need for a teaching and learning system with a wide reach which extends access to knowledge to an appreciably larger number of people.

B. Non-Formal Education

Distance education methods have been for some decades widely used in the Region to upgrade agriculturists' knowledge of farming techniques, and awareness of improved nutritional or health practices. Non-formal education of rural folk has in fact been attempted mainly through the broadcast media especially in countries with low literacy levels. These have met with a measure of success especially when targets are clearly identified and the relevance of the material and the effectiveness of communication methods field tested.

Reaching the Illiterate. Participants pointed out that it is important not to limit distance education facilities to formal education but to extend a well thought out program to non-formal instruction also. Large sections of the population will still be left out of the mainstream of development because they are illiterate, and so far there are hardly any successes reported in the eradication of illiteracy by distance methods alone. In fact it is admitted that bringing about even attitudinal changes through the audiovisual media alone is a very difficult task. Studies to improve non-formal instruction are required so that large, rural, adult populations can be helped to upgrade their lifestyle and knowledge of the modern world.

C. Formal Education

Educational Support for Primary Levels. While most of the resource papers led discussion to center around tertiary level education and sometimes specifically only around open university, there was a strong body of opinion that the regional experience available in distance teaching for secondary and even pre-secondary groups should not be ignored. However, caution was needed in preparing a program for very young school children. A mode in which teachers, pupils and peers are distanced and interaction is curtailed, may not be able to deal adequately with the development of the cognitive and affective domains and the socializing processes of young children. But the methodology for teaching this age group has been developed and tested in the developed countries of the Region and may be used in suitably modified forms by the DMCs. (Experiments in this direction are being conducted in some countries, for example, in the Philippines and Indonesia.)

Pedagogical Considerations at Secondary Level. The problems of isolation and limited interaction do continue into the secondary stages of education but it was pointed out that there is an appreciable body of students in DMCs who have taken up private study, sometimes with the aid of correspondence schools and this, too, is study in isolation. For these students, broadcast and audiovisual support would alleviate the monotony of learning through correspondence alone. Privately-run coaching classes and night schools are other established ways of beating the rush for education and most students who pursue these methods are obviously highly motivated. While they do suffer the disadvantages of isolated study or overwork they are probably mature enough not to need the same amount of interaction that the average student in conventional on-campus situations receives. Thus distance methods are in many ways an improvement on the methods already in use.

Recognition at Tertiary Level. Although even at tertiary levels, some pedagogical problems remain and methods have yet to be devised by which they can be overcome, it was felt that they are not so crucial as many students at this level are likely to be adults or young adults, already employed and seeking to upgrade their opportunities in the employment market. The problems and emphasis here are different. They are more those of relevance of courses and recognition of the degree or diploma by future employers. Participants were concerned that the students of open universities or colleges would not be accorded the same recognition as those of the better traditional universities.

Acceptance in the Marketplace. There is a general view that distance education is for dropouts or people who have otherwise failed. How would such a perception affect the status and effectiveness of open universities? For these reasons, the question of excellence at tertiary levels of open learning systems is even more urgent than at secondary levels. With the prospect of large numbers of degrees bestowed by open universities, there is a strong likelihood of generating frustration among job seekers especially if social and academic recognition is slow in coming. Part of the argument for open universities rests on the question of widespread social benefits through comparatively less expensive education as against the costs of increasing conventional campus facilities. If the job placement of students is not nearly up to their expectations this argument may be weakened.

D. Continuing Education

The Seminar noted that distance education methods have proved to be effective in updating the knowledge and skills of those already employed. It offers a second chance for those who were disadvantaged or compelled to drop out of school and can be a most apt way of offering continuing education to all those who want to keep abreast of developments in a knowledge-conscious world. In developing countries, illiterates can be informed by audiovisual methods, so as to draw them into the mainstream of development processes. Women in many countries have taken advantage of distance education as it suits their often house-bound circumstances.

Human Resources Development. It was observed that aside from the conventional understanding of educational goals there are new challenges and urgent needs that have to be met. Besides having to provide education to the less privileged, there is a growing recognition of the need to improve productivity, the national intellectual base, the quality of life, to develop human resources and consequently to help achieve national developmental goals. It is always difficult to quantify the benefits of non-formal education programs, but it is recognized that the offer to upgrade knowledge, not necessarily with a view to employment, is also a desirable function of education. Distance education methods can certainly help to enhance such programs.

Upgrading Skills. Industrial and other training needs can be met with distance education methods as the classroom can be carried to the work place, saving valuable manhours away from work. Many commercial organizations are marketing the use of these methodologies for the in-service training of public service professionals such as teachers, doctors, management staff and engineers. Besides in-service training, initial training has also been supported by such methods. Firms and governments alike have encouraged distance learning methods in their ongoing technical and vocational programs through both broadcast or narrowcast techniques.

Priorities and Problems. Before proceeding to examine in detail the major issues of costs, technology and educational materials, among others, it would be worthwhile noting a few more reservations and opinions voiced in the course of general discussion. Many of these were brought up time and again underlining the interplay of social requirements, resource constraints, national aims and different disciplines which go into the planning of a distance education system and show that it is difficult to apply conventional measures in deciding what kind of distance institution to have.

When making a decision to have open schools or open universities, governments hope to take education to the largest number of people in the quickest and most cost-effective way. They hope to improve the human resources of the nation, to relieve the mounting pressure on conventional institutions and hasten the pace of modernization. However, the numbers and several groups they hope to reach pose problems about the size of the operations needed to accomplish these objectives. In a system where teachers are not physically present, where self-teaching and consequently high student motivation are the elements to be sustained, added to which are the logistical problems of large-scale operations, there are important considerations of setting up an effective administration, creating quality teaching materials and exercising a fine judgment in deciding what media are the most appropriate.

Available Infrastructure. The infrastructure for the establishment of distance education organizations is already available in many DMCs. There are well-established correspondence courses where the main medium is the printed word and there are the broadcast media alongside other electronic technology which have been used on the national and provincial scale for the purposes of information, education, entertainment and communication. Experiments have been conducted in many DMCs with satellite-based instructional technology. It is almost certain then, that the methodology of distance education will optimize these facilities and bring into greater focus the educational possibilities of all these media.

Financially Viable Systems. Distance education's main justification lies in the financially viable education of far larger numbers than conventional systems can support. The rising real costs of traditional education and the pressure upon limited resources such as buildings and insufficient cadres of teachers - who could be of varying quality – considerably reduce the access of the greater number of people to education. In distance learning systems the cost per year per student may be appreciably lower. The media costs drop steeply as the clientele rises. As a program, once produced and viewed or heard by more people is more cost-effective. The number of full-time staff employed in open schools or universities is usually much less. Added to this is the optimum use of existing university libraries, buildings for face-to-face sessions and science laboratories. Telecommunications services and networks and human resources such as subject matter specialists, teachers and technology experts are all part of the available infrastructure that distance education can exploit more fully.

Sustaining Quality Institutions. While admitting to the advantages of open learning systems, other participants felt that it was important to evaluate and strengthen the existing educational and communications systems. Experiments with distance education methods could continue through pilot projects or tracer studies, to see if the high degree of organization required for successful, large-scale, open learning operations would be sustainable.

There were doubts expressed by some participants as to the capacity of some DMCs to absorb the costs and continuing demands of the electronic media. It was felt by them that smaller programs such as teacher-training courses through distance education may be an appropriate beginning. In some DMCs universal primary education has still not been achieved, one of the reasons being a lack of trained teachers.

Ideally, autonomous and centrally administered distance learning projects need a long planning period with sufficient importance given to organizational detail, the establishment of carefully considered managerial and other subsystems, the training of staff and the creation of appropriate conditions for communications coordination. Participants felt that without this long gestation period and an assurance of a reliable communications infrastructure, distance learning systems would flounder, becoming second-rate institutions. Even if the distance unit is part of a conventional institution, detailed planning and monitoring is needed.

Distance education, most participants agreed, was here to stay but there were still a range of issues to be resolved to optimize its use. Most of these had already been identified and efforts were being made in institutions all over the world to monitor and address them. Their reservations are outlined below:

- Participants were concerned about the ability of remote methods to help develop the personality and the analytical and interactive skills of students and felt that media-based instructional strategies may become weighted in favor of programmed or multiple choice methods of learning. This happens even with the printed materials of correspondence courses. Besides, study in isolation requires a high degree of maturity and independence for sustained learning and motivation. Information was sought on problems relating to the development of skills and attitudes relating to the cognitive, affective and psychomotor domains. While in principle it was maintained that these problems can be overcome, it was also accepted that in practice, every design for instruction and self-learning would have to be tested to reduce such problems.
- There were concerns about ensuring the quality of large distance education programs. While this method has the potential to impart learning to vast numbers, is it capable of providing quality education? If social equity is one aim, then equivalent standards at least must be offered. Will it be possible to establish and maintain a

standard which would offer students a reasonable chance for employment and convince employers that the product was worthy.

- It was pointed out that even well-planned open learning institutions have experienced not inconsiderable dropout rates, in part because they have had problems of reconciling the delivery and retrieval systems of course material with imperfect domestic facilities, as well as the problem of coordinating their own specialist teams to meet the deadline for preparing materials for timely dispatch to students. Such organizational lapses discourage a student who is already isolated.
- While correspondence courses, some private and some affiliated to universities, have tried to bridge the shortfall in the number of formal educational institutions, they have not been adequate because of insufficient planning. Distance education methods may help to improve existing courses.
- Experience has shown that the decision to include other media apart from print improves comprehension on the part of the student and enhances the quality of remote methods of teaching, but it pushes up costs. Continuing obsolescence, difficulty in obtaining spare parts and shortage of power could render a multimedia organization ineffective.
- The preparation of software or educational material for electronic media is time-consuming, often because of shortages of trained manpower, and expensive, and their educational effectiveness becomes, therefore, a matter for debate.
- As education, particularly higher education, releases more people into the employment market, some features of social marketing were considered such as a better coordination of curriculum and course design with the career and employment prospects and needs of students. To a large extent national policy would decide where the emphasis should be laid, but educationists also have to be sensitive to the relevance of the curriculum they choose. On all the above factors would depend the reputation of the distance education program.

Thus the main issues raised in general discussion were those of pedagogical problems, costs, planning time, competent management, what media to use, recognition and excellence in standards. Underlying all these was the question of which model of distance learning is appropriate and for whom.

COST-EFFECTIVENESS

Participants agreed that the implications, financial and other, of an autonomous distance education institution for formal education had to be carefully examined before a decision could be taken on the kind of organization to be established in their countries. Participants were of the view that centrally administered and funded institutions are easier and cheaper to run. It was noted however, that cost-effectiveness is a relative term in the face of mounting pressures on and cost of the conventional educational systems of DMCs. Thus, in assessing the cost-effectiveness of formal distance education programs, there are many variables and priorities which determine whether certain objectives are achieved at the lowest cost through a distance education program. Distance education is an innovative method devised to overcome some educational problems of modern and industrializing societies. It is the first time that very large numbers can be educated off-campus; it is also the first time that the conventional systems and the new systems are being compared on a unit cost basis.

While it is not easy to predict or measure through a universal format the effectiveness of a distance education program, it is less difficult to determine the cost of a formal distance education project. Several modes of distance education were mentioned but not examined in the same detail as the large, autonomous open university type of institution. The observations which follow relate mainly to such projects.

Capital Costs and Economy of Scale. Resource persons warned that distance education projects demand a large capital outlay and may not be considered less costly to start than conventional institutions. While they become progressively and appreciably less expensive in their operations than conventional universities, it may take quite a while before the number of students is sufficiently large to result in low average costs. Generally it is accepted that the clientele of an open school or university should be fairly large (50,000 to 100,000 in Asia). How large depends on the level and type of the course and whether it is in print, broadcast or other electronic media or a mix of media. In fact, the instructional materials, courses and programs produced for mixed media should be widely used to be cost-effective. Such economies of scale are required to bring down the costs of production of these more or less permanent instructional materials (permanent as against a conventional classroom lecture which, unless recorded, is generally not used again). The requirement for large numbers of students and other subscribers is determined by having to recover or justify the high initial costs of starting up. A lengthy planning period, skill and manhours spent in producing high quality self-learning materials, the cost of high standard subsystems which ensure timely delivery and feedback to the students, monitoring and evaluation systems which ensure the effective working of the organization add substantially to costs.

Staff Training Cost. Staff training for the special and different needs of distance education would require time and money. These specially trained staff may require higher salaries and better promotional prospects which has been the experience in distance education organizations in developed countries. However, the budgetary implications relating to staff are much lower in the experience of some open universities compared to the overall expenditure on the academic and other staff at conventional universities as a distance education organization requires appreciably fewer staff.

Experience of Mixed Mode Institutions. In mixed mode institutions, the distance education operations or units appear less expensive than the on-campus ones. While South Korea has the autonomous Korea Air and Correspondence University (KACU), its schools also run distance education units quite successfully. Australia, too, seems to find the distance units operating effectively. This may be one method of evaluation in view of the incomplete information on the costs and effectiveness of a cross-section of autonomous distance education institutions (in the Region).

Media Costs. The cost of using broadcast and electronic or other media varies in the Bank's DMCs, but in general it was agreed that the use of these increases the fixed cost and some recurring costs of open education. Studio facilities and maintenance costs are not the least of these expenses. While the use of multimedia was advocated, the participants noted that Israel's Everyman University has kept its capital and some recurrent costs low by concentrating on correspondence courses whereas Japan's University of the Air has experienced high media costs. However, geographical factors may dictate the use of broadcast and satellite technology. Depending on priorities, the poorest countries may well opt for sophisticated educational technology.

Constraints of Poorer Students. When deciding to use broadcast or narrowcast methods planners would have to take into account the likely insufficiency of private receivers or playback sets (and the cost i[illegible]red if the student decides to buy equipment). There are other constraints on the students of developing countries, such as the lack of an appropriate study place. These considerations may make it necessary to rent or build study centers which will provide student facilities, but again this burden cannot initially be passed on to the students.

Cost Recovery. Thailand's STOU retrieves a moderate part of its costs through student fees and sale of materials, while India's Andhra Pradesh Open University depends more on fees. Most other DMCs embarking on extensive distance education (which includes the use of the electronic media) would emphasize that the cost to the student has to be kept low and not reflected in the fees and that even low-cost study materials may have to be subsidized. There is no reason, however, why governments should not subsidize distance education when they do so for conventional education, and no reason why other educational institutions should not buy the instructional materials at cost price.

In science and other subjects requiring practical work the cost of study materials and laboratory materials, though generally kept low-priced, would add to the student's burden. In Asia's poorest countries science and technology are likely to be of high priority; therefore, fees might not be considered the major component of cost recovery strategies and the charge to students would be dictated by their ability to afford the expense.

Studies in Student Profile. Thus while considering the possibility of recovery of costs a profile of the student clientele would be appropriate. Such a study would determine whether it is economically and practically possible to charge the students sufficiently as to make an appreciable difference in returns. Some measure of this would be available at conventional universities.

Support from Government. Detailed discussion on the subject was not possible at the Seminar but it was generally accepted that remote teaching institutions would have to be initially and primarily supported by direct government financing or through grants or donations. Another component of cost recovery strategies would be the sale of instructional materials, courseware and audiovisual materials. The services of open universities, the rental of their studios, their expert advice and other special services could also earn revenues. In conclusion, the capital outlay on distance education programs was acknowledged to be high while revenue-earning capabilities would not become apparent very early.

Trade-offs. On the other hand, such equivalent education programs, while expensive to establish, do offer certain trade-offs worth noting when considering costs. They are likely to put to optimum use the existing communications infrastructure besides using more fully the facilities of conventional universities and schools such as buildings, laboratories and, in some cases, the staff. Many of these investments and talents lie grossly underused while the cost of such waste goes unnoticed. National academic talents and other sources of knowledge would also be drawn upon and on a part-time basis.

Economy of Scale and Personnel. It is well known to distance educationists that personnel costs on the whole are much lower than in conventional systems. In face-to-face education, a lecturer is required for no greater number than a hall can accommodate. In distance education one course designer and one subject specialist (engaged for a short term) suffice to teach tens of thousands of students. Such an intensive use of existing facilities is a cost-saving feature of open teaching institutions which should not be ignored.

Innovation and New Skills. The unusual skills required for a good open education program are likely to create new career avenues. The methodology and materials produced may be widely used by conventional and other equivalent institutions and bring about changes in teaching and learning methods. In terms of national benefit, this, too, is a development of talents and an optimization of human resources. The typical student is generally employed and studies during leisure time thus optimizing his own opportunities. On a national level, too, the advantage lies in not dislocating experienced labor and personnel while attempting to improve their standards.

In general the following points were noted:

- New open learning systems are likely to be centrally administered and centrally funded. Starting up involves considerable expense. Planning has to be intensive and extensive and includes the structural, functional and operational layouts of the subsystems and overall system. Feasibility studies, pilot projects and setting up of training institutions, which would be desirable, increase the gestation period thereby increasing capital costs.
- The production of instructional materials, if it includes software for multimedia, is costly and requires an assurance of large user bodies and student enrollments to make it cost-effective. But the materials can be sold to other organizations and countries and are thus a potential source of revenue.
- Training for new skills also increases the starting up cost.

Trainees would include all middle level management, course writers, curriculum designers, counsellors, researchers for course evaluation, software or program producers for educational media, technicians and others. Training time includes long and short-term courses.

- A multimedia approach is generally advocated but it is expensive. National priorities will determine whether or not to have a media mix, as for example in countries where geographical features hinder people from easy access to education it may be necessary to use broadcast media. (Less developed countries now have the option to go in for satellite technology – leaping over several older technologies.)
- Cost recovery strategies may include fees and the sale of learning materials, audiovisual programs and expertise. The cost to the student may have to be kept low.
- Distance education should make full use of existing facilities such as school buildings, communication, etc. Teachers and subject matter specialists will usually be engaged on temporary basis.

TECHNOLOGY

The range and gamut of communications technology were examined and a few illustrated to show the direction that educational media are taking and the ways in which they can be exploited. Experiments in Japan and Australia show that an almost face-to-face interaction is possible through selected media and interfaces. Facsimiles, slow-scan video, videodisc and compact disc, interfaced with computers, are now used even in conventional education. But the selection of communications media must be determined from both the standpoint of effective delivery and the cost of such media. Cost has two aspects. There is the cost to the institution of buying, working and maintaining expensive equipment, and the cost to the students of buying playback or recording machinery. As for effectiveness, it is fairly well-established that some media are better suited to impart and fix certain aspects of knowledge and experience, while others have a supportive role to play. For example, technical and scientific subjects may need audiovisual media as well as computer technology, where a great part of musicology could do with sound cassettes and print. Matching the medium to a specific subject and to the requirements and idiosyncrasies of the recipient is an important consideration.

Choice of Media. In the context of ground support: The decision to use broadcast or narrowcast methods for instruction presupposes an efficiently working services sector which would include post and telecommunications, a reliable power supply, maintenance services and the availability of spare parts. It needs an excellent cadre of audiovisual program producers to work with trained course designers for effective media-based tutoring. The limitations and potential of the media to communicate and the need to overcome tendencies to passive learning on the part of the student, should be well understood by educational planners before they decide on the proportion or mix of electronic media to the printed word and face-to-face instruction.

Limitations of Media. It was accepted that media-based learning still has its imperfections. Participants noted that the use of mixed media in education poses problems which have not yet been fully solved and at times requires more sophisticated technology to support its pedagogically incomplete aspects. Learning at a distance is often pursued through objective methods; technology tends to reinforce this. To overcome the problems of media-based programmed learning, some interfacing becomes necessary. Experiments with three-way computer-aided systems have been successfully conducted in Japan but even there the use of such advanced technology is limited. It was agreed that all DMCs cannot use advanced educational media and that traditional media, including printed material and radio, will continue to be appropriate.

The problems of passive learning encouraged by the multiple choice and objective styles in study, the lack of immediate feedback, and the lack of interaction and verbal reinforcement may pose major obstacles to the normal development of the affective and cognitive domains. This may result in stunting the analytical abilities, self expression and creative thinking. With regard to the psychomotor domain, too, many doubts remain particularly in the teaching of science and technical subjects. Though science and technical subjects are being taught through distance education, there is need for practical work and research in this field. Greater face-to-face support systems may be needed which would only add to the cost of remote methods. As mentioned, technologies for feedback and three-way communication systems exist and have been tried, but most remain out of the ambit of DMC priorities and are too sophisticated. Most DMCs with problems of distances and large uneducated populations may have a difficult choice to make if they accept the mixed media approach.

Media-based Education. Can distance methods produce well-developed personalities? Is scholastic excellence possible to achieve? Is distance education only for the underprivileged? Participants felt that since a feature of distance teaching is to reduce, very considerably, the face-to-face element and all those socially interactive characteristics which distinguish conventional systems, studies are needed on how this will affect large sections of populations in the Bank's DMCs especially as the Asian student is believed to be a passive learner. It was suggested that passive response may be encouraged by the medium, but also that audiovisual methods facilitate the development of the abstraction of concepts and encourage the expansion of pedagogical and self-teaching processes. It would be useful to study and objectively assess the effect that the new methods have had on students in the Region over a period of time, vis-a-vis those from conventional institutions.

Operational Difficulties. Some participants felt that the introduction of the electronic or communications media, while bringing improvements and innovations to conventional and distance teaching methodology through greater precision in the creation of course design and instructional materials, could pose operational problems which reflect the prevailing conditions in many DMCs. The most obvious limitations being those of the availability and reliability of their power supplies and the lack of good maintenance services. Less apparent but equally frustrating is the lack of expertise in educational software production. Educational technology is new and still requires testing to judge its effectiveness.

While the appeal of the electronic media is great, every country needs to pre-test them in its own conditions. There is, in many DMCs, a lack of expertise in the field of software design. It may be that the electronic media encourage the development of software production and the expansion of teaching and learning processes, the outreach factor, too, has considerable appeal; however, DMCs should proceed with caution before deciding on which media mix to use.

Geostationary Satellites for Education. As DMCs improve their communications and information networks there is a growing interest shown in acquiring satellite technology. Participants were interested to know the ways in which investment in satellite technology would increase the accessibility of DMC populations to television, radio and telephones. It was explained that as satellite systems have revenue-earning capabilities in their many other uses, such as telecommunications, which are of nationwide importance, the possibility of financially viable support from satellite technologies to educational media increases. To make optimum use of a national investment in educational and broadcast satellite technology, it is important to take the precaution of building a good base of technical expertise, producers of mass media software, program producers and maintenance services.

Improved Satellite Technology. Resource persons pointed out that more powerful satellites, improved designs, innovations and advancements in ground reception technology are likely to lead to a considerable reduction in the overall cost of satellite technology; it is simple to install direct reception community sets for the benefit of schools and colleges. Through satellite transponders time can be rented on reasonably attractive terms or, if this is available, a satellite channel can be had on a dedicated basis, as in the case of the Philippine satellite through the Indonesian satellite. Satellites can enlarge and enhance radio coverage and thereby serve educational needs. A satellite makes it possible to introduce networking facility, reducing the use of unsatisfactory terrestrial.

Access to Satellites. A future possibility involving direct broadcasts from a geostationary satellite to radio receivers has been explored and is being actively advocated by several developing countries. The International Telecommunications Union's World Administrative Radio Conference was asked to define the need for allocating suitable frequencies for the sound broadcasting service from geostationary satellite. This would increase the channels for education and provide excellent clarity of reception. Participants noted that there is great disparity between the advances made in technology and the access of populations in developing countries to it. It was important then, not just to have the promise of access in the future but to have timely access to satellite communications technology for educational purposes. Participants highlighted the need to obtain transmission slots on an equitable basis with the help of the International Telecommunications Union for educational purposes. Regional cooperation and concerted action in such ventures, they agreed, would be necessary.

Participants and resource persons agreed that a media mix enriches the teaching-learning experience but warned that the capital costs of obtaining technology, the recurring costs of producing software and the cost of obsolescence are not small. The experience of distance education institutions establishes that electronic media are not the main means of transferring knowledge and this fact should be noted before deciding to establish open learning institutions. The general agreement was that:

- while there is a very wide range of media and interfaces available, their effectiveness in terms of educational communication, compatibility with the subject have to be considered.

- good domestic facilities in terms of power supply, maintenance, availability of whichever medium is selected, software production and trained personnel are very important to the success of a distance education project.
- there are, in many minds, questions regarding the pedagogical implication of using distance methods which depend so greatly on the media. Passive learning is still something of a problem in Asia and may be reinforced by excessive dependence on the media.
- many countries may need to opt for higher technology in communication out of sheer logistical and geographical problems. These technologies may include satellites and computers. Ways can be found in which they become cost-effective.
- it is important to familiarize Asian countries with the language of the new technology, and it is important not to be left behind in gaining access to the most advanced technology.

INSTRUCTIONAL MATERIALS

From Curriculum to Instructional Design. The changes that distance education could bring about in teaching methodology are considerable. In the main they would be from the ephemeral to the permanent in teaching materials, from virtuoso teaching in a classroom to teamwork with non-academics and from an emphasis on what to teach to how to teach, that is, from curriculum design to instructional design. Resource persons pointed out that academic attitudes may undergo a change as greater efforts would be required to teach better. Subject matter specialists could now be drawn from other walks of life not necessarily academic. They may include agricultural scientists, pharmaceutical experts and others with applied expertise. Commerce and industry may come to have a greater say in educational strategy as employment opportunities become closely linked to education. Importance would shift to teamwork between subject matter specialist, instructional designer and program presenter, or layout and graphic specialist.

Changes in Teaching Methods. The prospect for teachers is likely to be transformed by the distance learning mode. In a system where the teacher is not present to answer a student's query or where it is difficult for a teacher to clarify a point or correct himself, it is essential to provide material that can guide the student at every step and anticipate most information requirements. Thus the preparation of distance instructional material requires a level of detailed subject analysis which is far greater than in conventional classroom situations.

Quality Learning Materials. The quality of this material, whether conveyed through the electronic media or through print, determines the success or failure of remote teaching; the quality and high standards of instruction determine the effectiveness of distance education. The care in preparing materials, it was stated, could not be overemphasized as only very high quality material will instill confidence in the student, prevent dropouts and establish the status and reputation of distance education institutions.

Training for Distance Education. Many new distance education institutions which are pressed for time sometimes have to, and do, fall back on the academic staff available in conventional systems. Participants were of the view that it is much more important to start training programs for all the multidisciplinary staff that a distance education organization needs, to initiate them in a new teaching strategy rather than hope that conventionally trained staff will meet the rigorous requirements of teaching through remote methods.

Design for Self-Instruction. It was pointed out that care in course material preparation applied not only to electronic software but equally to printed materials and that the same materials can be adapted to suit different media. Teamwork is needed to facilitate this, hence course creators, writers and program producers have to have a good idea of each other's disciplines while their insights into students' reactions have to be sharpened. Teachers and media specialists would therefore need to be sensitive to psychological and other obstacles in the way of learning. There are, indeed, problems of media resistance particularly from older students, thus computer fear may have to be overcome by supplying printed materials. Well-trained staff would be aware of such needs. It is inevitable that distance education will promote more research in the direction of educational uses of the electronic media and the impact of these efforts will be on improved teaching methods which in turn are likely to effect a change in conventional teaching methods.

Although the training of good producers and designers of high quality courseware seems to many policymakers an over-emphasized and expensive requirement at the outset, the materials they produce do have to perform the difficult task of reaching out to a distant student and having to take the place of absent teacher and peers. The creation of good print materials and instructional software is expensive and time-consuming but there are several ways of offsetting the cost. One is to sell courseware to the student, conventional institutions and the general public; the other is to contract the course design expertise and services of distance education organizations to commercial, industrial or governmental organizations. Courseware could be commissioned by commerce, industry and other special interests such as government departments for their non-formal educational programs.

Finally, it was suggested that DMCs could set up better facilities for the sharing and distribution of teaching materials between themselves. This would solve some problems of duplication and wasteful use of resources. Some subjects are less culture-bound and of universal application such as the natural sciences and mathematics and can therefore be adapted with less difficulty. Participants were of the view that the mechanisms for regional cooperation in sharing course materials should be examined as it is important to guarantee high standards and duplicating these efforts is costly.

The Seminar highlighted the changes in teaching or learning systems that distance education would bring about and how these would affect conventional teaching. Participants noted that:

- the role of teachers is likely to be influenced by the growing importance of courseware designers (a shift from the central position of the teacher) which requires the expertise of a subject specialist, course designer and printer or program producer.
- teaching methodology in conventional systems is also likely to be influenced by the distance education courses and self-teaching materials produced.
- training for multidisciplinary staff will be required as conventionally trained personnel including teachers, managers and technicians have to be taught to work in properly orchestrated teams to ensure effective delivery to clients of distance education.
- the need for excellence in instructional design and courseware cannot be sufficiently emphasized as the medium takes the place of the teacher. Students' interest can be lost very quickly if the materials are inadequate.
- arrangements for exchange in the region of software and course materials would be useful and would mitigate the tendency to duplication, especially as production of such material is expensive.

RECOGNITION AND STATUS

Government Support. Participants felt that the question of quality was primarily linked to normal reluctance in accepting a new system. Acceptance is generally linked to the placement of students in the job market. It was therefore necessary to examine these areas which are of greatest concern to the clients of distance education which include students and employees. It is important to launch a distance program with the highest government support as this signals to the populace a guarantee of intent. With the declaration of a national institution, with its program widely publicized, an impetus for the educational planners and administrators is provided, apart from which there are advantages such as a guarantee of financial support, early clearing of bottlenecks and access to national television and radio networks, facilities which also add to the status of institutions, particularly if they are autonomous.

Selection and Enrollment. At school levels the question of selection at enrollment is of far less significance (as it was presumed that universal education at these levels is desirable) so it is only at tertiary and out-of-school levels that the question of selection by enrollment was raised. The question was whether quality control, so essential to the credibility of distance education, should be exercised at the point of enrollment or whether this would be contrary to the egalitarian objectives of distance education. It was felt that selectivity at entry was ultimately to be decided by the institutions (which would reflect national priorities and administrative constraints) but that as a concept it was injudicious and that there were other internal mechanisms by which quality and standards could be maintained.

Monitoring Internal Standards. The internal standards set by the institution are another measure of its credibility. Setting standards for the staff is important. The production of quality instructional materials with a guaranteed system of delivery and retrieval and an excellent internal evaluation and assessment mechanism presupposes a well-formulated plan for across-the-board staff training. The multidisciplinary teamwork characteristic of distance education institutions requires an easy availability of highly trained personnel.

High Standard for Staff. It may be that, contingent on national resources, needs and urgency, newly started programs turn to personnel resources trained in conventional systems and this includes academic, communications software and administrative staff. This generally happens when the time and resources alloted for starting up is insufficient. While such expedience is unavoidable, participants felt that for the enhancement of the academic standards of distance education institutions it was essential to put a high priority on programs for training personnel especially for distance education.

Relevant Curricula. It is important that in-service groups and open university students find opportunities for employment and enhance their chances of promotion. Depending on national goals, distance education institutions which prepare students to enter the employment market should include such courses as would cater to the employment needs of their students. Some participants felt that the relevance of courses in the prevailing economic situation was an important element in the recognition of institutions; therefore, distance education institutions should, after identification, include such studies as would help students attain their career objectives. These measures should involve the cooperation of the leaders of industry and commerce as well as professional institutions. Follow-up studies to see how students fare would be an essential evaluative exercise.

Monitoring. Setting up sound mechanisms for monitoring distance education subsystems, including the admission of students, the administration of production and delivery systems and an evaluation system for course materials, should be a priority subject for distance education planners so that efficient distance education institutions are created and maintained. Finally, reliability in the evaluation and assessment of a student's performance is another measure by which credibility is established.

Independent Status. Initially, some DMCs have recruited known and respected staff from conventional universities to conduct examinations or student evaluation which is one way of establishing repute. But participants were agreed that the reputation of a distance education institution has to be established and maintained independently of the conventional system and that, since its methods and even its objectives change and reach out beyond established ones, it would be undesirable to merely transfer the culture and prejudices of the professionals of older systems in the hope that some retraining will suffice to overcome a lifetime's convictions.

Mixed Mode as an Alternative. It must be mentioned here that the effectiveness of the "mixed mode" in which conventional schools and universities run a 'distance' unit could be examined as an alternative. This mode, while it has some disadvantages, has the ability or flexibility to mesh the conventional with the distance methods of instruction. While there was not enough discussion on this subject, it is well known that many countries have used this option to suit their circumstances.

Credit Systems. Established distance education organizations have found it useful to employ the credit system in assessing students and a modular system for courses to increase the flexibility of the programs. The credit system allows students to take courses whenever or wherever it is more convenient for them; of course, such a system may imply greater complexity in organization particularly if the conventional systems have not been drawn into coordinating with distance education organizations to make their awards interchangeable. If traditional institutions could be persuaded to accept the trimester or semester system, it would increase the flexibility of the entire educational system and facilitate the transfer of students from a distance system to a conventional one. There is considerable economy of effort in creating educational materials for distance education particularly if the modular system is applied. The course is complete in itself and can be used at any time, by any applicant. The life of these materials is severalfold longer than that of a conventional lecture and they require only occasional modification and updating. The same basic material can be scaled up or down, say to tertiary or middle school levels, in the same way that large print runs and large audiences for lessons broadcast have their own economies of scale. Examinations for distance students might have to be conducted by established universities and their professors to assure the students of quality and recognition.

It was also mentioned that open universities can and should encourage research. This would improve their academic status. Most students of distance education take a longer time to get their degrees and many of them are older to start with than average college-going people. This reduces the status and acceptability of the open university somewhat.

In general, participants agreed that the:

- open learning systems should not encourage selection at the enrollment stage of open schools and universities. Semester, trimester and modular systems allow students to drop out if they feel they cannot proceed to the next course. This is a good enough mechanism for selection.
- training programs for teaching and other professional staff should be given top priority and workshop briefing for teachers

who have grown accustomed to another system would not be appropriate or sufficient.

- it was emphasized that curricula need restructuring for distance education use and also have to be relevant to enable students to apply the knowledge gained to their daily lives and to amplify their employment opportunities.
- research and evaluation cells should be a part of distance learning organizations, so that the system and the materials are under continuous scrutiny.
- examination and other validation programs may have to be carried out at first by reputed universities. It is unlikely that modular courses and credit transfer systems would be blended into existing systems very early. But it is desirable to enhance the flexibility and acceptability of systems by making all systems compatible.

PLANNING AND MANAGEMENT

Initial Planning. National authorities normally undertake a fairly thorough examination of the socioeconomic implications of large-scale programs before they are launched. Feasibility studies and possibly pilot projects are conducted before projects commence. While these form a stage of initial planning, more in-depth planning and pilot projects are called for when the concept itself is still as new as distance education. In distance education programs, some complex features make it necessary to give more time to careful planning and understanding of all the problems involved. Thus it is useful to continue well into the operational phase with those who were involved from the early stages of planning. Thailand's open university is an example of long and careful planning in the Region. This is not always the case. So far correspondence schools, even if they are extensions of universities, have not undergone enough planning for development, which is one reason why they are often held in low esteem.

Planning and Management. The need for meticulous planning of distance education organizational management, monitoring and evaluation systems, it was felt, could hardly be overstated especially in autonomous institutions. Distance education is a change of concept in the strategy and design of educational systems. The number of students is very large, the teacher is remote, the student has to be motivated enough to confront the challenges of self-discipline and self-dependence, a motivation which could falter without sufficient support. While most instruction is conveyed or supported by the printed word in conventional systems, distance education may use a combination of several media. In such a system it is imperative to understand the failures which are likely to occur and the possible controls that can be exercised.

Other Distance Education Modes. Formal distance education organizations may be large, autonomous bodies, a part of conventional organizations or be fed by other distance education schools. There are several types and combinations, and DMCs could choose the type that suits them. Participants discussed the advantages and disadvantages of large autonomous organizations such as an open university which can make their own administrative, and to a large extent, budgetary decisions. The mixed mode alternatives in which the distance education methodology is a part of the conventional system was not discussed in as much detail though there were suggestions that such an option may be useful to some DMCs. There are also those institutions which are affiliated to foreign open learning schools or universities and use their materials and their accreditation.

Cross-Cultural Interaction. Open universities encourage a departure from the traditional ivory tower culture. In the open university, it was pointed out that internal policy and organizational decision-making, close interaction between academicians and others including subject matter specialists, program producers and printers routinely take place, such as did not occur in conventional systems. While this interaction is essential to distance education systems, it is not always smooth. The academic and industrial (producers, printers, etc.) cultures could clash giving rise to delays in decision-making. There is no universally applicable solution to this problem however, and most institutions would have to work out solutions for themselves.

Logistical Needs. Distance education systems, it is claimed, are very much more exacting of the standard of their personnel because of the high degree of organization required by the new instructional methodology. There is the fact that lessons must give exact information with lucid explanations whereas classroom lectures generally do not undergo the same step-by-step analysis. A similar scrutiny is required for curriculum and course design. Heterogeneous disciplines have to be welded into harmonious teams to create the right teaching courses and produce high quality educational materials. The correct and compatible medium has to be chosen, programs developed for it and deadlines met. Delivery and retrieval systems must be coordinated to ensure that student motivation is encouraged and maintained. The experience of correspondence courses with high dropout rates underscores the need for excellent lines of communication. Planners have therefore to consider good training programs for the various categories of manpower such as managerial, technical, academic and evaluative. If multimedia are accepted then all the feeder lines, such as the state of the communications network and systems, import needs, power requirements, trained manpower resources should be clear.

Monitoring. Participants felt that an internal evaluation of academic programs and of subsystems, or monitoring, was an important component of distance education institutions. New course materials ought to be field-tested in order to ensure effectiveness while reassessment and updating of older material should be periodically carried out. The working of the entire program would also need to be reviewed continuously in order to keep abreast of developments such as dropout rates which can often be high in open learning systems. Finally, the subsystems need careful monitoring to see how useful the service is proving to be to the student. Media compatibility to the subject and the teaching effectiveness of the chosen medium have to be constantly appraised and researched.

Social Marketing. Another function of monitoring would be to determine the demand for various skills in the employment market and to try to match these with necessary changes made in the curriculum. Participants were of the view that sectoral groups could examine the needs of potential employers – such as in industry, agriculture and in other professional sectors – and help to evaluate or modify curriculum and course content from time to time.

Study Centers. Participants pointed out that for various training courses, study centers have to be maintained and run for a good part of the year as many students do not have an appropriate place for study, private audiovisual equipment or access to the electronic media. Sometimes the situation calls for assembling large occasional groups as in China and at times even residential requirements as in teacher-training courses. Careful planning, organization and monitoring of such activity has also to be considered. Student counselling is an important section of this face-to-face component and has to be skillfully handled particularly when the time is too short for developing relationships and where cross-cultural barriers exist.

Access to Broadcast Media. Managerial skills are called for in all the aforementioned areas and further in identifying and negotiating the correct time slots for broadcast programs, often a very difficult task.

National radio and television networks have to be persuaded of educational priorities before they give away their prime time slots. These are generally the hours when students have access to TV or radio, particularly if they are already employed. If credit systems are chosen they have to be meshed in with existing systems to allow for the flexibility they offer. Preferably credit systems should not only offer flexibility within the distance education systems but also allow easy movement between systems. All these exercises require high management skills, monitoring by tracer studies and a high standard of efficiency. In the regional experience, monitoring has not been given due importance or rather the problem of objective monitoring by an outside agency vis-a-vis an unbiased internal monitoring system poses questions both of (i) resistance to assessments by external bodies, and (ii) the possible laxity of internal assessments.

Participants were of the view that time for planning – and time for experiments to see if all systems were the right ones and working – was rarely given. This kind of haste is more costly in the long run than the extended gestation period required by open learning systems.

- The centralized open university mode of distance education was discussed and the processes of planning autonomous organizations were described. Distance education, participants agreed, needs long and careful planning and feasibility studies.
- Planning, management, monitoring or internal evaluation, staff development and training and the student support system are some of the important areas which need early attention and priority.
- People from unidisciplinary cultures need retraining in order to coordinate better. In open university systems, heterogeneous experiences and other skills are brought together and may endanger the meeting of deadlines if there are misunderstandings and different perceptions.
- Management standards have to be high to ensure the smooth working of the systems.
- Monitoring of all the above systems, continuing appraisal of the relevance and effectiveness of curricula and courseware is an important feature. Monitoring as a subsystem is not given sufficient attention in the Region.

TRAINING

New Training Needs. Participants noted that there was a serious dearth of training programs for distance education program staff in the DMCs.

While there are several developed countries offering such training, DMCs will have to consider setting up their own training institutions which offer courses appropriate to local needs. At present newly set up distance education programs have to rely upon the aptitude of conventionally trained staff to adapt to new concepts. Distance education requires academic and communications software materials to be clearly analyzed and sharply focused. These materials, resulting from the cooperation and contribution of several disciplines, are permanently open to assessment by the student and review by the general public. With regard to the administrative staff it should be recalled that the organizational complexity of distance education institutions is greater than the traditional learning institutions. The administration and overall management of distance education organizations break new ground in teamwork. Thus distance education systems face new and immediate personnel challenges which must be expeditiously met by starting good training institutions.

Relevant Training. Training programs need to be relevant to local needs and their standards need to be set by drawing up appropriate minimum requirements for various staff appointments in a distance education institution. Open learning institutions may like to press for and recommend new concepts and higher standards in academic and managerial training for the satisfactory functioning of remote teaching centers. As distance education organizations are multidisciplinary and heavily dependent on teamwork, prospective staff or trainees may have to be inducted into new working concepts at an early stage. Practical training is invaluable as it helps in inculcating the new philosophy of teamwork. At every level staff training will require an awareness of the new distance education culture.

Teachers and Training. Most countries are already furnished with some teacher-training organizations. These courses could be expanded to include specialization in distance education requirements. Conversely, distance education methods could be used for training conventional teachers. Some participants pointed out that many of the distance education institutions already have teacher-training courses although there was some dissent as to whether distance education methods are successful in training the teachers and trainers. Many overlook the need for personnel training programs or at best include some very cursory re-orientation programs for technical and academic staff from conventional institutions. This is a short-sighted policy but often cannot be avoided because of the expense involved in properly researching projects and giving sufficient priority to training. There are negative aspects to this approach which could undermine the best efforts to set up a good alternative mode for mass education.

Participants defined three broad areas in which training is required: (i) the academic and technical staff; (ii) the student evaluation, counselling and contact staff; and, (iii) the overall management and monitoring staff. Training was especially needed for:

- program planning for curriculum development and course design;
- course development requiring skills in writing and analytical organization of instructional materials;
- course production for educational programs, production of radio, TV and non-broadcast materials which may include sound and video programs. Editing, layout, illustration and printing of study materials;
- central systems planning and management which need longer training programs for management personnel. Those dealing with regional and outreach centers may require shorter training periods;
- delivery systems for face-to-face sessions, personnel involved in the creation and manning of study and resource centers;
- support systems and personnel for the development and staffing of libraries;
- research and evaluation including monitoring, feedback and statistical services;
- student counselling, which is of great importance as the direct human element is lacking. Distance education institutions may prefer to have their own specialized staff rather than use counsellors habituated to dealing with other situations;
- the creation of non-formal education programs which require specialized communication skills as do literacy and development programs;
- courses for subject matter specialists. Generally part-time, could be briefed at intensive workshops;
- higher level management and administrative personnel, too, who do not require long training; and
- the culture of teamwork which has to be given to all the above groups to avoid departmentalization and to emphasize coordination.

INTERNATIONAL COOPERATION

Exchange Visits. Exchange visits within the Region will broaden perspectives and encourage commitment, participants felt, and therefore the possibility of teacher exchange programs should be further explored. The same would be true of program producers for educational media, who could benefit from short exposures to different systems of organization in the Region.

Planning. Participants were of the view that greater regional coordination and cooperation in the field of planning for distance education was required. Capital outlays were high at the initial stages of setting up an open university. It is at this stage that detailed information was most crucial in order to be able to make the correct decisions in setting up a distance education program. Many of the DMCs cannot afford yet to start with or set up their own database.

Training. Training of personnel whether of higher levels or of middle and operational levels can benefit greatly through region-wide exchanges. Training can be of an initial kind as well as of an ongoing nature, so long and short-term training facilities should be arranged bilaterally and regionally. Full-fledged training courses, workshops and personnel exchanges could be some avenues for cooperation among DMCs which could be facilitated through a regional center.

Database. The experience in educational media in the Region has not been sufficiently correlated. Several worthy projects and efforts have remained isolated and their experience not fully evaluated or utilized. Some of the DMCs and the developed countries of the Region have accumulated considerable experience and have knowledge of alternative teaching methods which could be the foundation of a good regional database. Course material, too, especially in the science and applied subjects can, after modification, transcend international and cultural barriers. Duplication of efforts in this area can be avoided through regional exchanges.

Monitoring. It was noted that monitoring and evaluation systems in the DMCs were often not of the desired standards. Regional organizations may encourage the improvement of these systems thus raising standards and may, if a DMC desires, offer evaluation services. Often monitoring and evaluation functions are overlooked in the initial stages of setting up an organization and later, through inertia, may only be carried out on an ad hoc basis. Evaluation expertise could also be extended through regional cooperation.

Credit Systems. Participants observed that credit systems and modular course structures were important features of distance education. Most DMCs are persuading their own conventional systems to accept a change or at least a modification of assessment methods so that credit transfers are possible between distance and conventional institutions. Regionally, too, this should be possible and encouraged, especially as this helps to maintain and improve standards and therefore status.

Technology for Education. Communications technologies are constantly developing and changing, besides which there are several novel methods of using older technology alongside the new ones. The use of technologies in the Region is wide and disparate and requires a coordination of experience so that appropriate methods of mixing and matching communications media to the needs of a country are studied and applied. Satellite technology for education could also become an area for cooperation in Asia and the Pacific. Studies of media and their uses with particular emphasis on the Region should be a part of the services offered in cooperative undertakings between and among DMCs who plan to set up distance education units. Such cooperation could also help in technical training both in software production and in hardware know-how. Whereas software creation is often very expensive, some subjects, such as mathematics, can cross cultural barriers and can be advantageously exchanged.

SUGGESTIONS FOR FURTHER STUDIES IN THE REGION

While the Seminar covered a very wide range of topics in detail some could be touched upon and only briefly thus future studies and further investigation in those fields are suggested. It was noted that cost-effectiveness criteria have to be applied, in the final analysis, by the countries concerned. However, studies may be initiated to examine programs (by types of distance education organizations, levels of education and subject-wise breakdown) in the DMCs so that a clearer picture emerges of those organizations which are already operational, and greater data is available to countries proposing to set up a distance education program.

Studies could be initiated in the area of secondary level distance education and in the use of distance methods to support formal primary education. While it is necessary to expand the base of tertiary education, there is also a need in Asia, particularly in South Asia, to extend primary and secondary education, along with technical, vocational and teacher-training programs. In many of the Bank's DMCs access to education is limited, even curtailed, by different kinds of isolation, geographic and socioeconomic. Many countries have had to find often expensive means to take learning to remote areas. Others have now to seek effective ways of overcoming problems posed by distances and large populations. The methods are neither unknown nor necessarily expensive. Australia and New Zealand have decades of experience in extending primary and secondary education to scattered populations and isolated children; they have not always resorted to costly, high technology methods, and much of their experience could be useful in DMCs. In Asia, too, the problem is to take the school to children. Their numbers make this prohibitive causing the extent of primary and secondary education to remain far below the desired standards, particularly in South Asia. Distance education methods may have to be used to overcome these problems.

Media studies in the Region are not sufficient particularly when applied to conditions and populations in countries in Asia. The developed member countries do have a wealth of experience in communications media and these can be fruitfully used, but field studies in the DMCs are probably not coordinated enough to form a satisfactory database. Apart from the educational effectiveness of the media in relation to Asian population, it would be useful to compare the costs of different media within a country or a system and analyze what elements affect such costs. It is also necessary to compare the communicative effectiveness of different media in an organization which is operational. Such studies would help to select the best media mix to modify any future programs.

Workshops and seminars to bring together conventional educationists and distance educationists would be useful as also exchanges arranged between industrialists, developmental experts and professionals in public health and teaching. Such meetings could persuade different interests to understand the uses of distance education while enlarging in a more meaningful way the scope of distance education.

SUMMING UP

It is a foregone conclusion that the number of distance education institutions will increase appreciably in the next decade in the Region and there will be considerable expansion at the university level. Large populations must be allowed access to education if the countries of Asia wish to upgrade their quality of life and increase productivity. While distance methods permit this expansion and accessibility more easily than the conventional, they can also be less expensive if carefully planned. Initial heavy costs are at present unavoidable but the scale of operations, the possibility of cost recovery through fees and sales of services and materials can make distance education a good alternative to the accepted on-campus methods.

Costs can remain high if care in planning is neglected. Some of the major areas of expense are in training multidisciplinary staff and the decision to use more than one medium of communication. Further, the low priority usually given to monitoring, evaluation and student support services can prove expensive in the long run, lowering the prestige of the institution through high dropout rates and declines in the acceptability of its students in the market place.

Many DMCs already suffer from a shortage of trained teachers for conventional institutions; they are also very short on trained personnel for the new multidisciplinary requirements of distance education. This area should therefore be of first priority for distance education planners. Staff training courses can be cost-effective, apart from being necessary, as there is likely to be a growing demand for jobs in the new fields opened up by distance education requirements. New careers are likely to be created by the new approach to education and for personnel ranging from course and instructional designers to technicians. Political pressure to shorten the process of training or to overlook it is likely to lead to a hasty revamping of teaching personnel trained in older concepts, with unsatisfactory consequences.

Most countries will opt for a combination of the electronic media and print. Distance education ought to provide an optimization of underused facilities, or conversely, could put a strain on overloaded communication networks and electricity supplies. Careful examination of these factors is required before decisions are made as to which other media are appropriate and sustainable. While there is a good deal of information on educational technology, local conditions and cultural perceptions play a part in the effectiveness of the chosen medium. Planners should also recall that several well-established distance education institutions still depend on printed materials.

Although many DMCs have a variety of electronic media very little training is given to program producers and technicians. There are some training institutions in some countries but they are generally below standard. In-service training and upgrading has not received much attention. With very few exceptions there is virtually no training for the production of distance education software.

Insufficient consideration is given to the question of monitoring and critical self-evaluation or even external evaluation. Fire-fighting measures are adopted when things start to go wrong. This, to some extent is what happened in Thailand, but appropriate measures were taken and the STOU now has a competent monitoring cell. Large autonomous institutions, such as were described, need specialists in this field to keep standards at a high level.

Distance education methods can be cost-effective, even profitable, as has been shown by commercial enterprises. The updating requirements of professionals and government officials is, in the more developed countries, often done through distance methods saving manhours of work, preventing dislocation and expense. In the same way commerce and industry have provided updating and refresher courses in the working place for skilled labor.

Cost recovery for open schools and universities is possible through the charging of fees, the sale of services and commercial production of educational materials for other conventional schools, companies and foreign markets. Cost-effectiveness can be judged firstly, by the national priorities the social benefits and needs that distance education can meet and secondly, by conventional financial measures. The latter include economies of scale and the possibility of recovery of costs as mentioned earlier. Thirdly, there is the successful placement of distance education students in jobs.

In order to enhance the utility of further education, open university curricula and courses must be matched as closely as possible to market requirements. The United Kingdom's Open Tech program may be an idea worth exploring for Asia. There are already some vocational courses as in Pakistan and the Philippines, and several under way as in Sri Lanka and Bangladesh.

Whether distance education is complementary or supplementary is probably not relevant at present. Education has to be expanded and adapted to fit new situations; the pressures on conventional institutions bear witness to changing needs. Educational planners hope to keep in step with changing ideas on what constitutes education and what the perceptions of people are. It is likely that distance methods will prove catalytic in changing several concepts of teaching and curriculum design and in the concepts of learning as well.

SUMMARY OF RECOMMENDATIONS

The Seminar made several recommendations addressed to the governments of the participating countries and to international and bilateral agencies. The major recommendations are outlined below:

(i) The Bank, UNESCO and other multilateral agencies could consider providing technical assistance in the form of (a) pre-project planning studies, and (b) exploratory studies to determine the most appropriate mechanism for regional cooperation in distance education. There may be a need to establish a regional institution for distance education. It was suggested that the Bank conduct a feasibility study to determine the most appropriate form of regional cooperation.

(ii) The participants noted that distance education has already been used for a wide variety of purposes. These include elementary, secondary and higher education in the formal education subsector, work-oriented education and in-service training in the non-formal education subsector. Distance education has also been effectively used for teaching disciplines ranging from the humanities to science and from technical to health care curricula. Distance education can help diminish inequalities in access to education and can enrich curricula. It was therefore recommended that planners and implementers investigate the potential of distance education in providing supplementary and complementary inputs as well as its role as an alternative system.

(iii) In order to enhance the quality of all aspects of distance education (admission, curricular standards, production and delivery, assessment and performance of graduates), it was recommended that governments and international institutions, including the Bank, support evaluation studies and undertake research projects aimed at improving the efficiency and effectiveness of distance education.

(iv) The Seminar recognized that the manner of financing distance education varies widely among countries. Keeping these variations in mind, the Seminar recommends that:

   (a) planners and implementers ensure that the cost to students for fees, media, material and personal expenditures be kept at a level that would not deter students from taking advantage of distance education.

   (b) funding agencies assess the extent to which a distance learning approach has been investigated from the viewpoint of cost-effectiveness.

(v) The Seminar called for regional feasibility studies that would evaluate the scope for geostationary satellite technology for educational links on countries where there is a prima facie case for using satellite TV and radio links.

(vi) The Seminar urged the governments of the participating countries and institutions concerned such as the International Telecommunications Union (ITU) to support the efforts of developing countries (a) in securing appropriate frequencies for operating geostationary satellites, and (b) in safeguarding the orbital positions necessary for their future geostationary satellites.

(vii) In order to evaluate the extent to which computer-based education can contribute to the efficiency and effectiveness of distance education, the Bank, governments and concerned institutions should support feasibility studies to identify optimum methods for producing and managing computer-based learning.

(viii) The Bank, UNESCO and other international agencies could consider promoting measures for meeting the training needs of developing member countries in various aspects of distance education particularly in improving instructional design for distance education courses.

PART II

SEMINAR PAPERS

Issues in Distance Education

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INTRODUCTION

Development is a process of structural change in the economic, political, social and cultural domains. Development starts with people, their education and their capabilities because people are the primary and ultimate focus of all development. The broader goal of development is to bring the entire population into the mainstream of the national development process, both as contributors and beneficiaries. In the final analysis, development is the development of an individual, each according to his or her potential, and in this sense education is a crucial aspect of development.

The concepts of development and the role of educational systems (both formal and non-formal) are determined by the socio-politico-economic features and cultural patterns of each nation. There is abundant historical evidence that through training in literacy and skills required in agriculture and industry, the productivity of people could be significantly increased. Education is no longer limited to either schooling or the production of entrepreneurs capable of increasing the gross national product, but rather aims at the development of human resources for a wide range of purposes. Learning rather than schooling has become the driving force of human capital formation. The two have not become uncoupled but the links have become loose and unpredictable. Thus the importance of the role of education in development can be seen in terms of the opportunities for individuals to develop their abilities. This emphasizes that economic and technological restructuring must be paralleled by an attempt to give the individual an opportunity to restructure his or her life. Physical and technological investments should therefore go hand in hand with investments on human resources development. In the words of E. F. Schumacher,[1] "Education is the most vital of all resources for development."

GENERAL ISSUES IN DISTANCE EDUCATION

Growing populations in the Asian and Pacific region demand appropriate education. Some three billion people, or about 63 per cent of the world, live in this region, mostly in rural areas. There are at present over one billion children and youth under 15 years of age in this region. Providing educational opportunities to this large and growing number is a major problem. The number of illiterates is growing faster than the rate at which they can be educated either through formal primary education or through out-of-school literacy campaigns. Women account for the majority of them. Another significant subgroup of illiterates is to be found in the rural areas. Illiteracy remains the major obstacle to development.

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[1] Schumacher, E. F., *Small is Beautiful*, New York, Harper and Row Publishers, 1973.

During the last two or three decades, second-level and third-level education has expanded at a much faster rate than education at the primary level. Unplanned expansion of third-level education has led to rising unemployment among the educated, in turn highlighting the question of relevance of the educational systems.

The formal education system provides rural poor and other disadvantaged groups only limited access to education. In fact, it contributes to a certain extent to the inequalities noticed in the field. Typically, nearly 60 per cent of the dropouts at the primary schools are from poor families, while 80 per cent of those who complete schools and colleges are from the top 20 per cent of society. Public financing of education thus presently involves a transfer of resources from the poor majority to the rich minority. There is, therefore, a need for designing alternative systems of education and establishing an integrated flexible learning system which can provide wider access to the rural poor, women and other disadvantaged groups.

The current pace of knowledge explosion and the slow pace of knowledge acquired in educational institutions demand a new strategy in terms of a minimum formal schooling to begin with, followed by experience in the field of work. Interweaving school and non-school experiences increase the value of education to the individuals. The phenomenon of dropouts and talented underachievers is another pointer towards the need to design alternative ways to educate people. This would also point to the necessity of introducing a system of non-formal education in the developing countries, a system which encourages dialogue between the teacher and the learner and allows people to take advantage of appropriate learning experiences while they continue their jobs.

Conventional methods of imparting instruction are inadequate, with the school no longer the sole purveyor of knowledge and shaper of social attitudes. The mass communications media such as radio and television can play a crucial role in the dissemination of knowledge. Mass media can provide the means to offer education in selected fields to large numbers of people without incurring huge expenditures on overheads and infrastructure. Properly designed and supported radio projects have the potential for improving learning.[2] Television can also be an extremely powerful instrument for education.

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[2] The World Bank, *Poverty and Human Development*, 1980, p. 21.

The expanding use of telecommunications, especially satellite technology in several countries, can help overcome many difficulties. Remote areas can be served by a satellite even without setting up a television station in such places. These technologies, if carefully planned and applied, will make a big difference in the matter of access to good education for the maximum number of people.

There are several reasons for suggesting a change in educational strategy. First, the traditional educational systems in several Asian and Pacific countries are not suitable in several cases to meet the challenge of economic growth. There is an increasing demand for education strategies which provide practical knowledge to farmers and rural youth for the development of appropriate skills. In several countries, the technological expertise needed for rural transformation has not yet reached the rural people and in many cases extension workers lack training in the skills of teaching adults. Second, the human and financial resources available for education are limited in many countries. Traditional and institutional methods have proved inadequate to meet the growing needs of formal as well as non-formal education. Third, there is a growing awareness on the part of educationists and policy planners, of the decline in the quality of education, despite quantitative gains.

The issues which warrant the attention of this Seminar are in my view: (i) major problems which are likely to influence educational development in the coming decade; (ii) the interface between educational policies and national development goals; (iii) effective alternative strategies to provide more equitable educational opportunities to rural poor, women and other disadvantaged groups; (iv) appropriate and effective measures to enhance quality, relevance and efficiency of education (both formal and non-formal); and (v) strategies for mobilizing more effectively additional human and material resources for educational development and optimal utilization of available resources.

In the final analysis, the educational systems of the countries of this region share many common problems including rising costs, budgetary constraints, lack of textbooks, inadequate supply and use of teaching aids leading to low quality and low efficiency of education, slow response in providing education relevant to development goals, lack of curriculum renewal and inadequate access to good education for many groups especially the rural poor and the disadvantaged. In addition, inefficiency in educational systems of developing countries is evidenced by a number of indicators such as (a) student dropouts, (b) student repetition, (c) low achievement levels, (d) underutilization of physical facilities and teachers' time and (e) continuing high illiteracy rate. In many developing countries, the demand for primary and secondary education has outstripped the supply of trained teachers. Untrained, undertrained and underqualified teachers have been pressed into service. Modern communication media through distance education can enlarge access to the best available teaching talent and benefit a large number of people. Distance education can be used to provide in-service training to teachers on a large scale. The Asian countries are finding it difficult to fulfill the goal of universalization of primary education, and are also not able to meet the increasing social demand for education at all levels through the formal structures of education. Therefore, there is urgent need for development of alternative strategies of education to meet the educational needs of the developing countries. Alternative approaches to education call for greater use of new educational technologies in the years ahead for which provision has to be made in any long-term educational plan.

DISTANCE EDUCATION: THE CONCEPT

Education is not only a social and moral imperative, it is also an economic necessity. Development holistically conceived in terms of cultural, social, political and economic domains calls for massive, need-oriented education. In turn, it is the need-based nature of education which brings educational technology[3] into play.

With the development of educational technology, the means and forms of providing teaching-learning situations have multiplied and diversified; so have the educational needs of the heterogeneous groups in the community. A single educational program (such as an inflexible conventional education system) proves inadequate to suit the needs of everyone. Conventional education systems with uniform methods of teaching do not make sufficient provision for the variations caused by socioeconomic status, age and economically different backgrounds. As a result, disadvantaged groups such as women have been unable to profit from this system. The traditional system, therefore, need to be augmented and supplemented by alternative methods and processes which emphasize individualization of instruction and self-determined pace of the learner.

In distance education, the focus is on the needs of the people to whom the education message is addressed. The determination of the educational needs of the various groups such as dropouts, out-of-school youth, on-the-job people, farmers, teachers, women, school and university students and illiterate adults is the starting point of distance education. Distance education systems are well known for their flexibility, individualization and adoption of new information, technologies in course development, production, delivery and student support as per their individual needs.

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[3] Educational technology can be defined as a process of identifying aims and objectives, planning the learning environment, exploring and structuring the subject matter, selecting appropriate teaching strategies and learning media, evaluating the effectiveness of learning system and using the insights gained from evaluation to improve the effectiveness of teaching-learning system.

Distance education refers to the teaching and learning process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner. Distance education in terms of media usually involves a combination of media (such as radio, TV, film, audio and videotapes, computers and microprocessors) so as to not only compensate for the limitations of an individual medium but also to derive the maximum advantage from all the media used. The media used in distance education are generally reinforced through correspondence studies and tutorial/practical sessions (as done in many countries such as Australia, Bangladesh and India) for: (i) pre and in-service training of teachers; (ii) academic courses for those unable to attend school or college; and (iii) adult education programs. The advent of modern communication media has shown that education need no longer be limited to face-to-face learning situations. Learning can be uncoupled from schooling. In societies which provide reasonable access to the electronic and print media, the time devoted by an individual to reading, listening and viewing exceeds that spent in traditional learning. The media such as radio, television and film – can teach people who have had little or no formal education and bring benefits to the very doorstep of the recipients.

Distance education methods could be characterized by: the separation of teacher and learner, the use of technical media, including print, to facilitate communication between the teacher and learner, two-way communication (with emphasis on feedback), and the teaching of people as individuals and not in groups with provision of occasional meetings through seminar, summer/winter institutes, local resource centers, counselling and guidance. Learning in the distance education mode overcomes the constraints of (i) specified locations and (ii) timings of study which characterize face-to-face teaching. The participants can choose their place, time and mode of study. It makes available to adults and out-of-school youth as well as educationally- disadvantaged groups, general, vocational and professionally-oriented courses without affecting their capacity to earn their livelihood.

Distance education has a great sociological justification as it can help not only in extending education but also in equalizing educational opportunities and thereby help varied and dispersed student populations, even in rural areas. The basic tenet of distance education is that education should be taken to where people are rather than the other way.

Distance education methods are used for formal courses at all levels, whether leading to qualifications or not, as well as for non-formal education. Contrary to popular belief, experience in some countries shows that technical and science subjects such as physics and chemistry are taught effectively through distance education. Recently, some developing countries, faced with a chronic shortage of skilled labor, have been experimenting with projects for teaching technical subjects by correspondence. At the university level, a large amount of theoretical work in an engineering degree course can be done outside the college, while the practical work can be done in short, intensive sessions during weekends or at vacation institutes. The Open University in the United Kingdom is an example where radio and television are used together with short compulsory courses for teaching practical, work-related aspects of science, computers and technology. The Technical Correspondence Institute in New Zealand, by arrangement with employers in the private sector, enables students of the Institute to do laboratory work in selected institutes for a short period in a year. Effective communication in distance education requires teaching programs which identify and meet the needs of individual students. Hence, the success of any distance education program would depend to a great extent on the quality of software and appropriate use of the communication media. Therefore, any distance education program needs to be supported by quality instructional materials and a core group of outstanding academics.

Many countries in this region have expanded educational opportunities by adopting the distance education system. Australia has a long-standing record spread over several years of achievement in this field. Attempts have been made in several developing countries of this region to explore the use of distance education to provide the rural poor access to education. I cite only a few: the School Broadcasting Program, Bangladesh; various institutes of correspondence courses in India, including SNDT Women's University, Open School of the Central Board of Secondary Education and Indira Gandhi National Open University; Allama Iqbal Open University, Pakistan; Korea Correspondence College, Republic of Korea; Radio Education in Nepal; Open University in Sri Lanka; and Sukhothai Thammathirat Open University, Thailand.

If distance education needs to be used in developing countries, educationists must remember to communicate clearly to the audience and must undertake programs to create new attitudes and values. To create the right climate educationists need to demonstrate that the recurrent costs of distance education are lower than other competing modes. A few guidelines on viability of distance education in terms of unit costs have emerged from the case studies done by Jamison and Orivel.[4] For instance, the higher the academic level, the lower would be the number of potential students required, other things being equal, to make the course cost-effective. In most countries, teachers engaged in higher education earn three to eight times more than those in primary education; therefore pedagogy in higher education could more easily accommodate substitution of labor by capital.

Justification for the introduction of new educational technologies might be found in areas where there is a shortage of trained and qualified teachers, or where teacher performance is poor, or where the subjects demand visual presentation which cannot be offered by a teacher. A media-based course appears to be more economical than a conventional course when a large number of students are involved and opportunity costs are lower.

Therefore, there is a need for an analysis of various projects to demonstrate the cost-effectiveness of individual strategies. For example, distance education projects limited to enrichment of face-to-face teaching or in the form of additional teaching for improvement of quality may not be cost-effective. But if distance education is focused on quality improvement, the investment is more likely to be cost-effective and similarly, the size of clientele for various courses and the nature of content could be another consideration for economic analysis of such projects.

THE WORLD BANK'S INVOLVEMENT IN DISTANCE EDUCATION

Out of 302 education projects of the World Bank, 32 (10.6 per cent) have incorporated distance education. The peak period was 1974-1978, when about 19.1 per cent of education projects included a distance education component. East Asia, East Africa and West Africa have used distance education most, accounting for 24 of the 32 projects. The World Bank's first distance education project was implemented in Ivory Coast in 1970 but with fairly discouraging results which to a certain extent could be attributed to lack of effective software, low-quality media lessons, and inadequate management and feedback systems.

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[4] Jamison, D. and Orivel F., "The Cost-Effectiveness of Distance Education Teaching for School Equivalency," in Perraton, Hilary, *Alternative Routes to Formal Education*, World Bank, 1982.

Since then, with rare exceptions such as the People's Republic of China III[5] (Polytechnic/Television University Project) projects have incorporated distance education only as a minor component. These projects could be classified in four categories. The first category includes those projects in which distance education was added on as an enrichment to existing face-to-face teaching. In the second category, teachers were deliberately replaced by distance education for part of the week to improve the quality of instruction. In the third category of projects, distance education was almost the only teaching method because qualified teachers and classrooms were not available in adequate number. These projects were mainly related to areas such as health and agriculture, or in-service teacher training. None of these projects involved teaching of children. In the fourth category of projects, distance education was the only teaching mode. An analysis of such projects with a special reference to their cost-effectiveness can help identify an efficient strategy for distance education.

ASIAN DEVELOPMENT BANK'S INVOLVEMENT IN DISTANCE EDUCATION

To date, the Asian Development Bank has not participated in any distance education-related program. The Bank has supported: (i) technical and vocational education projects at secondary and tertiary levels to strengthen physical infrastructures in general to meet manpower shortages; (ii) establishment of project-related resource and development centers for the development of improved technology and indigenous technology and indigenous technical capacity; (iii) in recent years, the development of science education at the secondary level; and (iv) university level education. The Bank's record relative to education projects shows that its assistance has been mostly focused on strengthening the physical infrastructure of education systems (e.g. by paying for buildings and equipment). The time has come to examine the need to review the Bank's strategy and examine the scope for distance education systems. It is also necessary to have a clear understanding of the goals to be achieved through distance education so that resource allocation may be made effectively by the developing countries. We look forward to the deliberations and recommendations of this Seminar for identifying the policy which can work best in distance education so that appropriate projects can be formulated. The Bank looks forward to your views on some of the major issues in distance education. Let me briefly mention some of the issues.

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[5] Hawkridge, David, *General Operational Review of Distance Education*, Education and Training Department, The World Bank, 1985.

ISSUES FOR CONSIDERATION

The technological revolution now in progress has already affected the way of life of people in developing countries but its effects on conventional methods of education, and especially on the communication of knowledge have been limited. The new technology alters the role of the teacher in relation to the pupils. The teacher is no longer the sole or main source of knowledge. Hence some measure of resistance is expected. Educational technology is often forced on the school before the school has understood what to do with it or how to employ it. A clearer definition of objectives is required.

The development and use of educational technology require much more planning and a longer gestation period than do the classical teaching methods. While it is true that economies of scale can be considerable in the application of new forms of educational technology, it is equally true that the unit cost can be too high when the target population is small and production costs are fixed. Moreover, distance education through the technologies such as radio/TV and films can lead to memorization and rote learning, since there is no face-to-face contact between the teacher and the student. Lessons taught through mass media, if not supported by printed materials, may not be retained. Hence, the design and elaboration of written support materials is considered an essential part ot distance education. What is the scope for involvement of the teacher in distance education? How can effective printed material be designed and produced in developing countries where there are already shortages of paper, of printing facilities and of expertise to design the course material?

There are also differences of opinion about the quality which can be achieved in distance education. Some argue that it is necessarily the second best, inferior to face-to-face education. Others claim that it has positive advantages, in enabling students to adopt an individual approach best suited to them. Some may not be of the view that distance learning provides second-best education to those who are already educationally disadvantaged. We seem to be in need of agreed criteria for determining the success of distance education. There are other questions: (1) How can an appropriate distance education system be established? (2) How can high quality teaching be maintained and a lowering of standards prevented? (3) How can distance education be closely integrated with the conventional system of education so that students can alternate between full-time, part-time and open learning courses? and (4) How can distance education be integrated with the goals of agriculture and industry?

Furthermore, there is a need for feedback mechanisms to be built into every distance education program. A system of evaluation and learning from the receiving end is necessary. There is also the technical aspect relating to the use of radio frequencies involved in distance education. The radio spectrum has to be used by individual countries, if need be, in coordination with neighboring countries wherever necessary, in accordance with the principles laid down by the International Telecommunications Union (ITU). This calls for regional cooperation. Technical solution to this problem calls for a concerted effort on the part of developing countries.

Determination of the priorities to be assigned in the use of distance education to formal and/or non-formal education is another area which merits your consideration. While in formal education the results could be quantified, the impact can only be ascertained indirectly in the case of non-formal education, though the latter may well be preferred on grounds of national interest, cultural uplift and social development. The goals will depend on the priorities of individual governments but the implications of the alternatives should be fully analyzed by experts.

An important aspect in introducing distance education is the development of appropriate educational content of the programs. Often the hardware tends to be overemphasized to the neglect of software which is really basic to the success of the program. The revision of curriculum design which may be long overdue in several areas, is crucial if the new methods are to succeed.

In several countries, distance education can be provided through satellites which can beam radio and TV signals to more than one location, region or country simultaneously. The information revolution, aided by satellites and computers, has yet to make its full impact in developing countries. The Indian experience in satellite education and the efforts of some South Pacific countries in beaming lessons through space have indicated the potential in this field. When sophisticated technology can be adopted for telecommunications in several developing countries, it can as well be used, with suitable modifications for education. However, the implications involved should be spelled out.

I now come to the need for trained human resources. In many cases, it is observed that the teaching profession has not attracted the best candidates. In developing countries, there is already a shortage of well qualified staff in the conventional education system. The promotion of distance education should not add to this problem. However, distance education can take inputs from a wide range of experts who need not be full-time teachers. Nevertheless, their utilization calls for expertise in designing courses. Training is therefore essential for those involved in distance education. In designing any strategy in education, our objective should be to prevent or at least minimize any mismatch between available human resources and the goals of development. What role can distance education play in this respect? How can wastage be reduced to minimal? How can the over-production of graduates be avoided? Can distance education be utilized in such a manner that its beneficiaries do not add to the problem of educated unemployment?

One of the most important tasks that distance learning institutions in developing countries have to undertake from the outset is that of creating new attitudes and values. Will distance education be given due recognition by the academic community? Can distance education gain social acceptance? Will employers including those in the private sector accept the qualifications conferred through distance education unreservedly? Can there be any means of ensuring uniform and high standards in a country where more than one institution offers distance education courses?

This distinguished gathering of experts, we hope, will give their considered views on these and other related issues so that the goals of distance education are clearly set and suitable strategies can be devised. To recall, the issues in brief are:

(i) outlining the future role of distance education in human resource development;
(ii) identifying strategies for implementing the role outlined in relation to the overall socioeconomic goals of countries;
(iii) designing new models involving modern communication technologies for ensuring the success of the strategies suggested;
(iv) developing strategies for ensuring quality of distance education programs, while enlarging its scope to cover the disadvantaged groups of society, such as women and the rural poor;
(v) preparing appropriate methods of ensuring due academic status to distance education, while retaining its flexibility and relevance to the techno-economic realities including necessary change in curriculum design suitable for the news modes of delivery;
(vi) issues of internal efficiency and external relevance of distance education; and
(vii) identifying areas for international cooperation and assistance in promoting distance education.

Without pretending to suggest any answer myself to these complex questions, may I submit for your consideration that success in this field depends on two conditions: one, an open mind so that we, the products of conventional educational systems, do not look down upon any innovation and two, a systems approach which would ensure a fair chance for the implementation of any new idea.

Growth and Scope of Distance Learning

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INTRODUCTION

In one sense education, which transfers attitudes, ideas, knowledge and skills to people, is like transportation which moves people and goods to a geographical destination. From the origins of homo sapiens he has been able to move himself by walking and inform others by talking and other human signals. But the invention of writing and the boat had a massive impact on the respective capabilities as did the invention of printing and the wheel. Distance education, from the viewpoint of the observer, or distance learning, from the viewpoint of a student, represents a further step forward in educational methods which may turn out to be of major significance in the years ahead if its potential is fully grasped and applied. There is no difficulty, now that we begin to recognize the shape that it has, in finding historical pointers to its development. Letter writing has been with us for several thousand years and certainly conveys knowledge and instruction. Printing enabled more to learn and laid down a stepping stone to mass education at a reasonable price. It also freed teachers and lecturers from the major task of writing up notes for students to copy though not all have caught up with that yet. A more organized forerunner still well established today is correspondence education which has opened the door to many who could not otherwise have achieved their potential. But its reputation in some places has suffered from over-commercialization and from high dropout rates. Distance education has built upon all these and other developments.

Distance education has grown so much over the last 20 years that it is now properly looking at its roots and theoretical basis. In a recent book, Keegan, has provided a guide to the literature in this field and examined distance education as a new discipline.[1] He summarizes the six defining elements of distance education:

(i) the separation of teacher and learner which distinguishes it from face-to-face teaching;
(ii) the influence of an educational organization which distinguishes it from private study;
(iii) the use of technical media, mostly in print form, to unite teacher and learner and carry the educational content;
(iv) the provision of two-way communication so that the student may benefit from, or even initiate dialogue;
(v) the possibility of occasional meetings for both didactic and socialization purposes; and
(vi) the participation in an industrialized form of education.

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[1] Keegan, D., *The Foundation of Distance Education*, Croom Helm, 1986.

The first two clearly separate it off from the conventional educational system and all the informal learning that takes place through our lives. Element (iii) is a key feature and should be interpreted as a mode of communication in which the use of technical media replaces the conventional teaching process and does not supplement it. This is often a point of confusion when referring to the increasing use of educational technology. In conventional institutions it is often seen as a way of improving the learning process by adding to what is currently offered whereas in distance teaching it becomes its core. This different approach will clearly be reflected in, for example, comparative costs as well as in the detailed design of its use. Elements (iv) and (v) are recognized as a crucial component of the strategy to reduce dropout. Though normally comprising a very small proportion of the total study time, they provide students with the valuable opportunity to overcome temporary hurdles, to be reassured about progress and to share experiences with other students. Element (vi) is the one which is causing most debate and in one sense splits distance teaching educators between those in special institutions and those in institutions which have a distance education wing. There is no doubt that in centralized institutions there is a considerable industrialization element. The production line aspect of course production, the compartmentalization of professionalisms, the warehouses, the distribution systems and the costs structure are all factory-like and this can be seen on campuses in Bangkok, Islamabad and Jakarta as well as at Milton Keynes in England. But there are not such obvious features in split-purpose institutions in Australia for example and to some extent it is the scale of the operation which determines the level of industrialization.

As is usual when major developments take place on a worldwide scale, there is no one reason why they have appeared but several whose thrusts coincided at a particular period of time.

The first is the excitement and perhaps the sales drive of the new technologies that have invaded the home in particular over the last 30 years. By this I mean the rapid growth rate in the communication technologies of radio, television and the telephone. Not so much in the home initially but equally exciting in its applicability has been the computer and as early as the 1960s much interest was shown in its capability as an educational tool. For a comprehensive survey of information technology in education one can refer to Hawkridge's book where he postulates both a learner's heaven and a learner's hell which depends on whether one views the developments as opening the doors for people to access knowledge in a cheap or simple way, or whether one views the future as determined by technology to the detriment of argument and debate.[2]

The second is the rapid growth of knowledge itself which has implied that many adults, as much for work reasons as for interest, have needed to return to some form of education. Their life situation, their motivation and sometimes their unwillingness to undertake the format of a learning process geared to children has meant that new ways have been sought to meet this demand. At the national level, the rate of advance of knowledge and associated developments has caused some governments to seek to meet skilled manpower demands through new, more flexible approaches. With hindsight, building colleges of education in UK in the 1950s and closing them in the 1970s does not seem a sensible policy from several viewpoints.

A third reason is the increasing cost of education. As the rights to education become more widespread, as birth rates increased and as the quality of that education already provided was improved, so the national bills for education were forecast to increase in a way governments would find it difficult to meet. Added to this, many countries have policies of discouraging urban drift and taking education to rural areas is an important objective. Finally the cost of education/training to the employer or individual is also an important parameter in deciding how much is to be undertaken.

The juxtaposition of these three thrusts has led many countries to set up planning teams to see the extent to which the distance education approach should be pursued and, in most of those, to actually make a provision. The challenge to the educators involved is, given the ingredients involved, to design a system and a learning package which meet the priorities of the country concerned and which maximize in a cost-effective way the learning attained, using the resources available. Thus over the last 20 years, new enterprises have been launched. Among ADB member countries several institutions have been founded in India centrally and some of its states, Indonesia, Japan, Korea, Pakistan, Sri Lanka and Thailand, and Australia has extended its own network. In Europe, the United Kingdom Open University (UKOU) was founded, followed by an institution in one of the West German states, and then in Holland and Spain. The United States has tried a variety of approaches and several institutions have been created in South America. If correspondence colleges are included, the number of distance learning institutions per region is as in Table 1.

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[2] Hawkridge, D.G., *New Information Technology in Education*, Croom Helm, 1983.

Table 1: How Distance Learning Institutions were Founded

	Institutions			
Region	**Founded for Distance Learning Primarily**	**Founded as Conventional and Now Doing Distance Learning**	**Conventional Institutions Developing Distance Learning**	**Total**
Africa	10	4	2	16
Asia	6	10	9	25
Australasia	13	20	7	40
Europe (East)	–	–	–	–
Europe (West)	57	27	17	101
Middle East	1	0	0	1
North America	30	41	31	102
South and Central America	7	5	7	19
TOTAL	124	107	73	304

In Europe and North America, a high proportion of those included are accredited private correspondence colleges. The number of students in distance learning institutions by region is contained in the following table from the same paper.

Table 2: Number of Students in Distance Learning Institutions

Region	In Institutions Founded for Distance Learning	In Other Institutions	Total
Africa	135,059	7,464	142,523
Asia	334,167	33,653	367,820
Australasia	99,419	52,780	152,199
Europe (East)	–	–	–
Europe (West)	593,516	36,932	630,448
Middle East	12,000	–	12,000
North America	308,257	198,589	506,846
South and Central America	57,768	26,695	85,463
TOTAL	1,540,186	356,113	1,896,299

It should be noted that the figures for China (currently 827,000) were not available along with a few others in this first analysis. The paper goes on to analyze number of programs at different levels, number of courses in different subjects and media used in the different programs, for example, out of the 468 programs only 27 did not use correspondence, 72 used radio, etc.

Throughout the wide variety of distance learning institutions, the main strength is accessibility allied usually to cost-effectiveness, the main weakness is its remoteness. We shall see later that, within the range of institutions, different types have their own strengths and weaknesses. For example, the UKOU is strong in the area of academic control, has continuity, is able institutionally to learn from its own experience, has low unit costs relative to conventional universities, can readily identify success or failure in its work through the performance of its students, and courses are on offer nationally. It is weak in that its course production system is slow, its decision-taking highly formalized and the mean number of students per course must be high for the institution to be cost-effective. So even with a large student body, the range of course choice remains modest.

The paper is structured to examine the needs that distance learning has satisfied and can satisfy in the economic, educational and social areas; look at the educational process that is employed using distance learning; investigate some of the operational models; and in conclusion highlight some of the issues that arise in the development process.

NEEDS THAT IT CAN SATISFY

It is useful to start by clarifying one issue that normally arises in discussing the above topic; that is the definitions of demand and needs and the relationship between them. Demand for education and training is what the individual customer or student actually says he wants. Needs are specified as a result of analyses of the future requirements of a country, or individual, for socioeconomic development. To get from need to demand can require a form of propaganda in the open market, or, for example, the use of a qualification to enter a profession. Demands can often be channelled into needs and can often exceed the level required, or rather affordable, as is often the case with medical training. Demand for education can add to the urban drift and, because of preconceived ideas from the formal education, can be tilted against distance learning because of questions about its quality and status especially in the light of some bad experiences with correspondence only education with which it is compared.

In this section, however, I will not move into the area of discussing ways and means of analyzing needs and stimulating demand but analyze the ways in which distance learning has responded to national problems in three areas – economic, education and social. Naturally there is a considerable overlap between them but focusing on each in turn will highlight typical challenges that are faced.

A. Economic Challenges

The needs for technological, technical and vocational education are extremely wide and varied and related primarily to the world of work. National variations reflect national work patterns. Needs are met to some extent by the conventional school and university systems of most countries. Support is also provided by technical colleges, or their equivalents in the public sector, by in-house training schemes in industry, by equipment suppliers, and by professional institutions and trade unions. But there are still considerable gaps in the provision which have been filled by distance learning means. For example the Allama Iqbal Open University in Pakistan has had 20,000 students on an Electrical Wiring course and in the Republic of China, the China Radio and Television University (CRTVU) provides courses for workers in electronics factories and banks. The demand for the updating arising from skills shortages and the impact of new technologies also arises at postgraduate level and distance learning provides a mode of response here, too. In the United States, the National Technological University, a relatively small central organization transmits courses by satellites to student groups in major companies in the USA and shortly to Europe. Local support is provided by local universities. This is one example of a trend to have large training centers within multinational corporations described in *Corporate Classrooms: The Learning Business.*[3] Another distance learning answer to keeping relevant development staff in industry up-to-date with emerging knowledge is video instruction used both in the UK and US. Many first degrees have been viewed as providing a stepping stone to vocational improvement and so distance learning degrees often satisfy the same need. In practice, for example, about half the UKOU students on its undergraduate program take courses for career development reasons.

Even at the level of technicians and supervisors, distance learning has had an impact although at the craftsman and operator level much less so. The initiative for the Open Tech Program in the UK, aimed at technicians and supervisors in British commerce and industry (though this included counter clerks and nurses), was based on the recognized need for more training at this level though increasingly the boundaries between technicians and technologists is becoming blurred. This blurring is matched by the level of educational courses required by this target group where there is a curriculum overlap with the higher levels of university education. This is exemplified by the fact that each year about 7,000 students who call themselves technicians and supervisors take courses from the UKOU undergraduate program. The changing educational demand from this employment sector is well illustrated by the decreasing need for draftsmen, as computer-aided design is introduced, and with an increasing need for electronic technicians. At the same time, for example, there is a reduced need in the aircraft and car industries for those solely trained in mechanics and fluid mechanics while programmers are still in relatively high demand. In the areas of demand, distance learning provision is now widely available.

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[3] Eurich, Nell P., *The Corporate Classroom: The Learning Business*, Carnegie Foundation Special Report, Princeton, New Jersey, 1985.

In many countries, there are stated needs for more management training, e.g. China, India, and distance learning is playing an increasing role here. The agricultural community is also well situated for a distance learning provision due to its dispersed nature and their needs have been met in part in Pakistan and UK by distance learning initiatives.

Even in countries such as UK where distance learning has been available for some time, the proportion of the need satisfied by this mode is still small though growing. For example, there was a recent survey by the Manpower Services Commission in UK in June 1985 entitled Adult Training in Britain. It was based on interviews in 500 companies in the private sector. The following relevant data emerged:

- In 1984, there were an estimated 53 million man-days of training for 3.5 million employees out of a total of about 10 million in the sector.
- This was broken down into:
  - (i) 34 million man-days on-the-job training which includes formal procedures such as articled clerkships, or working alongside a member of staff, or being shown the work by a supervisor;
  - (ii) 17 million man-days of face-to-face instruction during working hours including day release, in-company and external training. This can include the use of distance learning materials within the company's in-house provision;

(iii) 2 million man-days of distance learning and evening classes at times outside the working day.

- The total of 19 million man-days of off-the-job training represents 1.9 days per employee year under half that in West Germany where the average is about 4.7 days per employee year.
- Business performance was measured by the combination of six parameters such as profitability, increased output, etc. and then measured against levels of training activity such as the proportion of employees trained, number of training days per employee, etc. On each of these latter measures, high business performance was strongly and positively associated with a high level of training.

The importance of these data in demonstrating the need for more open and distance learning is clear. Knowledge is changing rapidly; management is recognizing the need for more training; budgets are squeezed; and distance learning can provide the training with less time of the employee away from productive activity. In fact distance learning can use slack time on company equipment to advantage. For example, services such as banks, or travel agents which use video display units in local branches based on a central computer can have available training programs on the central computer which can be called upon when required.

B. Educational Challenges

Provision of a primary school level of education is still one of the major challenges in DMCs and in several countries there are many more adults who need access to it than children of relevant age. Distance learning can help tackle this problem in two ways and is unlikely to be of help in a third. The first way is to train the primary school teachers themselves the majority of whom are in rural situations. Major programs to do this have been launched for example, in Pakistan and in Kenya, while teachers are often initially a high proportion of the students on degree programs by distance learning, as at the UKOU, where the higher qualification implied a salary enhancement. The distance learning mode has an additional advantage with the particular target group, it can provide some much needed resource materials for the use in the school.

The second need that distance learning can help to meet is the education of adults at the basic level. Group learning for functional literacy can be supported in the local environment by distance learning, more particularly by radio and television in its early stages. The better trained primary school teachers can be of additional help here in that they can act as the local group leaders. The need that distance education seems unable to tackle is a direct provision for children at the primary school stage on a large scale although Australia has examples that contradict this.[4] At secondary school level, however, pupil needs can be satisfied in this way as was described in Perraton for Brazil, Malawi and Mauritius.[5]

But it is at the higher education level that many countries have satisfied need through the use of distance education institutions. Conventional universities are expensive institutions to create and as the numbers in younger age cohorts increase so there is the need to provide alternative routes to a higher education. In other countries there is the need to provide for those who were unable for a variety of reasons to take up their opportunity earlier in life. Thus the RTVUs in China provide this type of opportunity as does the UKOU in Britain. The Universitas Terbuka in Indonesia provides an opportunity for both constituencies.

The other needs that distance education can satisfy are associated with inadequate provisions for disadvantaged people. Thus it is particularly apposite for handicapped people who find it difficult to leave the home environment. It provides educational opportunities for those in prison. It can satisfy the educational needs of people in remote, sparsely populated areas as in Australia and Canada, and those of ethnic minorities and refugees (as was undertaken by the UNESCO project in the Middle East some years ago). More generally, it can offer educational opportunities to other special groups in society such as women who work in the home.

The changing pattern of demand from adult students for qualifying courses (i.e. courses with examinations) in UK is summarized in the following table derived from a research project as 'The Mature Student' in the UK which should be published shortly. The survey covers more than just the distance learning provision and reflects the pattern of demand.

Instrumental reasons were defined as those which were specifically for career advancement or change. Self-development is a general term while some indicated that they were interested in following up a particular subject. As might be expected career reasons decrease with age while interest for interest's sake, increased. Men were more career-minded than women. The distance learning students at the

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[4] Taylor, J., *Application of Distance Education in Formal and Non-Formal Education*, ADB Seminar Paper, 1986.

[5] Perraton, H., *Alternative Routes to Formal Education*, A World Bank Research Publication, 1982.

Table 3: Main Aim in Studying Analyzed by Sex and Age (%)

Reason for Taking a Course	Men	Women	Total	Age 21-30	31-40	40
Instrumental	73	59	67	76	62	42
Self-Development	13	20	16	11	20	29
Interest on Subject	11	17	14	11	15	23
Other	3	3	4	2	3	6

UKOU were more likely to be studying for self-development than in other institutions but this may be for logistic reasons as taking full-time courses would imply not working during the course. This would weigh the decision to follow such full-time courses heavily in favor of some perceived reward after qualifying.

C. Social Challenges

Distance education has been used to bring health care, child care and nutrition programs to the people to enhance the impact of programs of social development. This use of distance learning is not restricted to developing countries and has been used for updating parents in child care in developed countries, too, including some examples of special courses for parents of mentally handicapped children. Few of the courses so provided are certified and the associated group activity is more often a 'self-help' group of parents. Some courses have been created to respond to the growing demand for individuals to participate in community life and national decisions. UK illustrations of this are a course for school governors when a new regulatory system was introduced and a course about the European Economic Community (EEC) when UK was contemplating entry.

THE EDUCATIONAL TRAINING PROCESS

A. Translating the Needs into Learning Aims

In distance learning systems, the range of needs of the students is much greater than in the conventional systems and the number of styles of course requested is greater. The optimal mix of teaching strategies and use of media is also an important matter to address. In this section, we will examine the first part of the process and classify the needs in a way which owes much to the work of J. J. Sparkes and which is designed to assist the course creating process.[6,7] This leads to definitions of different types of courses. For example, when a farmer needs to update himself on new pesticides, or a doctor about new drugs, his basic requirement is for new knowledge. He normally understands how to apply them and has skills to do so. If, on the other hand, some new piece of equipment is used on the farm, or in the surgery, he is likely to need a larger skill training component of any course. Then if a farmer changes from arable to dairy farming, he not only needs new knowledge and skills but also a new understanding of the whole operation. A similar need would arise if a doctor moves from a gynecological to a psychiatric department.

These examples show that it is helpful to focus on three major aspects of cognitive development in distance learning since each facet can be supported in different ways by different media. The first is skill which is concerned with applying knowledge to practical problems of one kind or another. Intellectual skills to mathematical problems for example, manual skills to typing while laboratory experiments would be a mixture of the two. Understanding is concerned with conceptual development, being able to explain situations or events in terms of the concepts and generally puts knowledge, the third facet into a structure. Knowledge is basically a collection of new facts. We are all aware of things we know without understanding how they work, the usual example being the internal combustion engine among many of its users.

So the courses which respond to these needs tend to be labelled in different ways. Training courses are concerned mainly with the development of skills needs, particularly manual ones. Awareness courses are aimed at people with little knowledge of a subject area and consist predominantly of knowledge, e.g. courses for the general public on microprocessors, weather or elementary hygiene. Updating courses are also mainly knowledge based but are for those who already are experts in their subject area but who may be out of contact with recent developments. Academic courses, such as those in colleges and universities, are aimed primarily at increasing understanding with varying proportions of knowledge and skill required because of the subject area. Then there are conversion of interface courses which aim to increase knowledge

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[6] Sparkes, J.J., Stewart, D., Keegan, D. and Holmberg, B., *Distance Education*, Croom Helm, 1983, pp. 251–266.

[7] Sparkes, J.J. and Bates, A.W., *Role of Technology in Distance Education*, Croom Helm, 1984, Ch. 18.

and understanding in fields outside their own specialization, e.g. mechanical engineers who need to work in electronic engineering, arts students who take up posts in computing companies, or professional staff who take up a managerial role. Upgrading courses are intended to raise the overall expertise of an individual in a particular subject area; for example, health workers who take formal courses in nursing or technicians who become technologists by taking higher level courses in the particular subject areas in which they work. These courses often have qualifications attached to them.

This analysis can be summarized in the table which follows with estimates given of the various cognitive components. This is a modified version of the table in the Sparkes paper.

Table 4: Cognitive Content of Different Types of Courses

Type of Course	**Typical Percentage Content**			**Assumed Understanding in the Subject**
	Knowledge	**Understanding**	**Skills**	
Awareness	90	10	0	Little
Updating	90	10	0	Much
Training	10	10	80	Little
Academic	20	60	20	Some
Conversion	45	45	10	Little
Upgrading	45	45	10	Much
Language	55	20	25	Some

Language courses have been added as a particular example. Those who read educational psychology will be aware that this breakdown has excluded the learning in what is termed the affective domain, i.e. learning attitudes such as persistence, tolerance, etc. and values in such fields as religion and aesthetics. It can be argued that involvement in a distance learning system requires a degree of persistence of high order, and perhaps tolerance from one's family, but in general distance learning has no distinguishably different effect, so they will not be addressed further.

B. Choosing the Educational Strategies to Match the Learning Aims

Again the format of this summary owes much to the approach adopted by J.J. Sparkes. In one sense, presenting knowledge to a learner is a straightforward activity, the major challenge being whether the recipient is motivated to learn or expected to learn. Fortunately the former attitude is more often present among adult distance learning students but for other target groups, and even for adults in some cases, it is necessary to make the knowledge interesting or relevant. Knowledge conveyance is best supported by descriptions either written or spoken, but in particular (i) science and technology find audio vision with color slides, or computer terminals a valuable medium; (ii) music and languages require audiotapes; and (iii) art and natural history benefit from the use of television or film which can also act as a stimulator of interest.

Raising awareness, mainly a knowledge-raising exercise, is often structured so that television, with its potential for wide national impact, acts in the lead role with follow-up activities of a passive kind. Updating courses, which again are primarily knowledge based, normally require the attention of an interactive mode in the learning process since the students already have a sound basis in the subject and need to ask follow-up questions. In developed countries, this can be undertaken through teleconferencing as in some extension work at the University of Wisconsin in the US, or on Teletext, or through expert computer systems. But for some, the face-to-face classes are still used as with a course for doctors in UK on Drug Therapy. Although the OU produced the material, the tutorial classes were the responsibility of the postgraduate medical centers in hospitals who could handle the more detailed questions.

Teaching 'understanding' requires the learner to approach the concepts from differing angles and to receive reinforcement through discussion in some form. It is more difficult to learn by heart and needs a much deeper mental grasp. This leads to a teaching strategy sometimes referred to as redundancy where the same concept is presented to the student in a variety of ways. This in one sense is very apposite to distance learning since the different approaches can be made through the different media. For example, the concept of momentum can be displayed vividly through television, analyzed theoretically in a learning text, and undertaken practically through an experiment talked through on an audiotape. Each different approach builds up the concept for the students. Discussion does not necessarily mean face-to-face activity with a teacher, though that is a valuable method of implementing it. A form of 'discussion' can take place with a well-designed computer program or even through self-assessment questions within the teaching text since they, too, can achieve the objective of clarification achieved normally through discussion. In this context discussions with fellow students, without the presence of teachers, is often undertaken by students in semi-formalized activities called self-study groups.

The teaching of skills can be split into two parts. The first part consists of demonstration and instruction. Videotapes are an extremely valuable, though expensive, way of providing this for they enable the student to replay as many times as may be necessary how things are and should be done. In a sense it is an apprenticeship in which the student can watch the master as and when he chooses rather than wait upon the latter's availability. The long-standing cheapest method is the instructional manual with audiotapes and audiovision playing a valuable role. The other part of skill training requires the student to undertake the practice and can be one of the major difficulties in a distance learning system. For specialist training, for example for pilots, very expensive computer-based simulators are used but for distance learning cheaper computer simulations can now be used on microcomputers. But for practical work in general, some hands-on experience is necessary and for most courses with this requirement some laboratory working is provided either locally as in Pakistan or nationally in summer schools as in the UK. This is backed up in the UKOU by some carefully designed home experimental kits but such a component of the learning package has not been widely adopted in other systems partly because of the complexity and partly the cost.

C. Pragmatic Constraints on the Educational Strategies

Even though we may agree, as distance educators, what the best educational strategy might be for a particular course, the logistics of the situation might mean considerable adaptation of the optimal strategy. For example, part-time professional tutorial support is not always available in the localities in which it is required. The list of possible media in distance learning systems in addition to print is quite large broadcast radio and television, audiocassettes, videotapes and videodiscs, satellite and cable, slides, large and small computers, telephone teaching, teletext systems and home experiment kits. These can be backed up by tutors and counsellors, study centers and local media resource centers.

The first constraint may arise from a lack of accessibility which applies to both the learner and the institution. Postal services are a crucial part of the delivery system and if these are unreliable in a country, different approaches may have to be used. Television sets may be owned by a relatively small proportion and this often applies to telephones, too. Certainly access to computers, while increasing rapidly in some countries, is still at a low level in the majority. Furthermore, equipment provided in study centers, such as videocassette recorders, often needs local qualified technicians for maintenance. At the family level, a student in a distance learning system may find it difficult to find a quiet place to study or to get access to the radio at times when there are competing interests of different members of the family. So student environment by itself can render a distance learning provision inaccessible and other available meeting places may need to be included in the planning.

Then there can be the difficulty for the institution of accessing the support services it required. If, for example, broadcasting services are fragmented into different local coverages, it may be difficult to obtain a comprehensive broadcast coverage for students. Even if broadcasting is undertaken by a national body, there can be other priorities in their programming which restrict access.

Cost can be another constraint. Even if the institution has access to air time, the rates charged may be excessive in relation to normal educational budgets.

But perhaps more important are costs to students, for if these are too high then sufficient student numbers may not come forward to make the whole system cost-effective. But even if there is a government policy of low fees, course designers who recommend too many set books, or too frequent visits to a study center which may be at some distance from the home, may present hardships for students. So, this too can act as a constraint.

Organization and management of the system as a whole can also act as a constraint on optimal educational strategies. As was mentioned previously, one can take the view that distance education is an "industrialized teaching which is based on an objectivized, rationalized, technologically produced interaction" (Peters 1973, summarized by Keegan, 1986).[8,9] If the scheduling of the editing, designing, printing processes is poor, or stock-control or distribution is weak; the system may collapse. It has been known that broadcast times have been changed without warning and this can produce severe problems for the remote student. The implication is that considerable planning and resource has to be put into the operational system and course designers have to avoid making their particular educational mix too complicated for the supporting operational and administrative system.

There is another aspect which is frequently misunderstood by those

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[8] Peters, O. *Die didaktische Struktur des Fernunterrichts*, Untersuchungen zu einer Industrialisierten Form des Lehrens und Lernens. Weinheim & Beltz, 1973.

[9] Keegan, D., *The Foundation of Distance Education*, London, Croom Helm, 1986.

responsible for setting up distance education systems; that is the length of time required to prepare courses. Courses may take more than two years to prepare and rarely less than one year. To those accustomed to traditional teaching methods, this tends to be somewhat of a surprise but is readily understandable when one appreciates the production line aspect of the educational process and the average time taken to prepare different components of the learning provision.

Table 5: Academic Input Times for Different Educational Methods

Teaching Method	**Typical Ratio of Academic Man-Hours per Student Hour of Work Generated**
Lecturing	2 – 10
Tutoring	1 – 10
The following also need support staff:	
Audiovisual	10 – 20
Teaching text	5 – 100
Broadcast TV	over 100
Computer-aided learning	over 150
Interactive video	over 200

Even though the length of time taken to prepare courses may be appreciated by the practitioners, external political pressures and latent student demand tend to be at a high level at the launch of an institution. The new staff, too, are keen to show the potential of their institution and produce a few courses in an enthusiastic burst. Students who take the courses then demand more to build on their foundation course at a rate the institution is then unable to attain, and a considerable number of students become disillusioned.

Experimental and hands-on training requires special mention in the context of distance learning systems and it is useful to compare this aspect of the provision in the different programs of the Open University and Open Tech Unit in UK.[10]

When a full distance learning regime is in force the constraints on experimental work are severe. If students are able to attend instructional centers, even for a modest fraction of their total time of study possibilities are greatly widened. It is in this area that the Open Tech Programme has substantial advantages over the Open University.

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[10] Blackburn, D.A. and Smith, R.C., *Distance Learning for Technical and Vocational Education at Pre-University Establishments of Open Type*, UNESCO Series, Studies in Technical and Vocational Education, 1986.

Experimental work for students of the Open University takes two main forms. The simpler is the work done at residential summer schools on the campuses of conventional universities. In these schools the students use apparatus and project equipment owned by the Open University or rented by the Open University from the host university for the period of the school. This work differs from that done by full-time students only in that the in-laboratory experimental work for a year-long course is concentrated within the one week of summer school.

For the rest of its experimental provision the Open University depends on home experiment kits, known as HEKs, which are sent to students and permit them to do experimental work at home. Constraints on this provision are those of mass, volume, hazard and cost. Kits are delivered to students' homes but need to be of a mass that can be handled by one person and of linear dimensions that will enter the door of a house. With forethought and suitable packaging it has proved possible to set students a useful range of experiments in physics, chemistry, biology and materials properties. In the areas of computing, electronics and robotics the kits have proved particularly successful. Students have equipment of sufficient complexity to allow them to do projects which call for them to design, construct and test electronic circuits. For this sort of work, where pieces are generally small and light, the primary constraint is that of cost. An upper limit of about £1,000 limits the choice of equipment but, because the University makes its purchases in bulk and often designs its own equipment, students each receive equipment which might cost as much as £2,000 on the open market. Kits are returned at the end of the year and are expected to have a life of four to five years.

Because the Open Tech Program is offered with local support the matter of hands-on provision is greatly simplified. Home experiment kits are used, but students mostly visit institutional centers for the hands-on part of their work. Openness is provided by avoiding the use of set hours wherever this is possible. In some courses students are able to walk in as they choose and carry on at their own pace.

D. Creating the Courses

At the International Conference to celebrate the 10th anniversary of the Open University in 1979, working groups on curriculum and learning came to the conclusion that there were three principles which should guide the balance between the educational aims and the pragmatic constraints.[11] Two applied to course creation and all were based on worldwide experience at the time.

The first principle was that a distance learning system needs to allocate a high priority to producing learning materials to the highest possible quality that resources will permit. This is in marked contrast to the attitudes in conventional education systems, where material resource provision is often the poor relation, but is essential when the predominant means of communication between an institution and a student is through the media. The second principle is that the wider the range of media used in a distance learning course, the greater is the proportion of students who succeed in learning effectively.

The consequences of following these two principles are that many more quality checks are required in the development of a course (increasing the time taken) and many professionals are involved in its creation; for as well as the educational/training professionals are audiovisual producers, editors, illustrators and external subject experts working together. So increasingly the team concept has been adopted with shared duties and scheduled activities although, where the system is based on enabling external students to gain access to internal courses by distance learning means as in Australia and France this mode is less well established.[12]

The concern for quality is essential not only because materials are the prime educational pathway to students but also because the length of life of a course and its materials is typically 4 to 8 years and sometimes 12 years. With all the initial investment this implies it is important to get the package right from the outset and to make sure that sufficient time is all allowed to do this. The time is needed after initial course planning to cover the following typical steps – a consultant preparing a first draft of one of the learning texts; a criticism by other team members of its style, content, etc.; an investigation as to whether, and if so in what way, an audiovisual component, or kit, or assessment question might reinforce the learning being undertaken; some development testing; decision-taking on the level and nature of the illustrations and diagrams used; the construction of the assessment questions; and the provision of tutor broadcast notes, etc. Several books have been written about course development[13, 14, 15] so only its main feature will be described here.

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[11] Neil, M. N. (ed.), *Education of Adults at a Distance*, A Report of the Open University's Tenth Anniversary International Conference, London, Kogan Page, 1981.

[12] McKenzie, M., Postgate, R. and Scuphaim, J., *Open Learning*, UNESCO Press, 1975.

[13] Baath, J., *A List of Ideas for the Construction of Distance and Education Course in Distance Education: A Short Handbook*, Malmo, Liber-Hermods, 1982.

[14] Lewis, R. and Jones, G., *How to Write a Distance Learning Course*, London, CET, 1984.

[15] Rowntree, D., *Developing Courses for Students*, England, McGraw Hill, 1981.

First, the processes described in sections 24-48 are assumed to have been undertaken and that the students target population is well described, the length and level of the course is prescribed; the media available within the constraints are known; and that budgetary estimates are available. The team then undertakes the process of designing the internal structure of the course, allocating tasks to its individual members and scheduling its production. In some cases the team will be relatively small, 3 or 4 members, and rely heavily on external consultants; in others the number of internal members may be large, up to 20 or more, although in reality this only applies to the UKOU at this level. Detailed learning objectives would be delineated for each part of the course to match the target student time allocated to that part and each of the media will be determined. For example, in the early years of the UKOU we listed formally possible uses of radio and television (see Appendix 1). Two or three drafts of each learning text may be written and commented on. Student assessment would be determined and perhaps a question bank set up. The course team would be aware of feedback from previous courses, for example that students rate audiocassettes highly because of their ease of use and education potential; and would decide what evaluation should be undertaken on their own course. There may be wide differences between the amounts of time spent by course developers on the different activities listed above but the underlying aim should always be to maximize the quality of the product.

E. Human Support for the Students

This introduces the third principle for distance learning systems, that is, where they can be organized cheaply and appropriately, student groups coming together to learn, with or without tutors, can increase learning significantly and/or decrease dropout; and generally increase its effectiveness. There are two facets to this. Firstly that the system may be designed on the basis that students are in groups and that individual students are not accepted or are considerably disadvantaged by the form of provision. 'Group' recipients dominate in the provision in such countries as China where the Radio and Television Universities direct their courses at student groups in factories or in banks. In Africa, where an organization called INADES provides courses in agriculture in some ten African countries, one requirement for entrance is membership of a group since one of the objectives is to revitalize village communities. The group approach is one that is often used in developing countries for this and other reasons. For example, the use of trained tutors or group organizers sent out and organized by a central organization can be an expensive undertaking and the use of the better-educated members of a local community to fulfill this leadership role after brief training is often essential to mount such programs as basic adult literacy and health as well as agricultural ones. This approach is used more widely in non-formal education, where the intention is often to stimulate some local action although in the Chinese system most of the courses are part of a qualification awarding system.

Even in the systems where more formal tutorial support systems are provided this can take two forms. There are those in which other local educational institutions such as universities or colleges are given responsibility for providing the human contact. This is the basis of the provision in Indonesia and France. In others, individual tutors are selected by the central organization, albeit often through its own regional offices as in the case of the UKOU. Differences of viewpoint on these two matters depend to considerable extent on who registers the students and whose qualification is awarded. Since, in the case of the UKOU, there was considerable concern for the quality of the local support and the standard of assessment, it felt it needed to monitor and train its own part-time regional staff. In India this is taken further in that there are plans to include examinations in the training process and award qualifications which will be a pre-condition to the employment of the part-time staff.

In summary, human support for students provides an important interactive route for the institution to advise students entering the system, tutor them face-to-face; or communicate by telephone, audiotape or correspondence, and is provided in the immediate vicinity of the home or workplace or at special residential schools. Self-help groups of students without the presence of tutors can also be a valuable addition to the learning process.

F. Assessment and Qualifications

Most distance learning organizations provide a significant number of courses for qualifications though different organizations tend to concentrate on different academic levels. Most of the newer institutions have been set up at university level while many of the older correspondence institutes in India, New Zealand with its Technical Correspondence Institute, provided courses at a lower level. An exception to this pattern has been the Open Tech Program in UK launched in the early 1980s. Most institutions, therefore, provide routes to nationally recognized qualifications on a par with others within the same country. This requirement has had several different impacts on the educational structure of a distance learning provision.

Firstly, it has meant the widespread adoption of the modular system with credits which can be accumulated, under prescribed rules, into certificates, diplomas and degrees. The equivalent of an OU degree with other degrees is based not only on the views of external examiners and assessors but also on the basis that the student in the distance learning system should spend approximately the same number of hours as an average student does in a conventional university in his formal and private study. This led in the UKOU system to the basis that each full credit course (6 are required for an ordinary degree, 8 for an Honors degree) should take approximately 450 hours of student time and course teams work to that figure.

Secondly, it has led to carefully regulated, often computer managed, assessment procedures with considerable thought going into the assessment process by course teams to meet the objectives of teaching the students (formative assessment) and measuring his attainments (summative assessment). It is this latter objective which often gives rise to questions about the validity of the process in a distance learning system and it is worth making a few points about this.

Formal invigilated examinations at local examination centers are a part of nearly all credit awarding distance learning systems. (At higher academic levels and in special cases, project work may be the basis.) Since it is possible to take many modules to achieve a degree (up to 14 in the UKOU) some would say that an OU student is formally examined more than a conventional one. But in a distance learning system, this is most often backed up by a continuous assessment system which at a minimum consists of tutor-marked assignments; often contains computer-marked assignments; and sometimes includes formal examinations in study centers. These tend to have the twin purposes of formative and summative assessment and typically can count for half the marks towards a credit with the course team or institution determining the particular weighting. At the end of the academic year, before any overall grade is awarded, any large discrepancies between continuous and final examination assessment are investigated. Recourse is provided in difficult cases to part-time tutor views and oral examinations. Thus, most within distance learning institution would argue that summative assessment is as reliable as in conventional institutions and overall more thought is put into the processes to provide motivation and feedback to the student in the formative sense.

Two issues afflict distance learning institution in the same way as conventional ones. The first is the extent to which the assessment determines the curriculum and structure of the course and, particularly for courses for professionals, the balance between the academic and the practical. There are no easy answers to the concerns expressed about these but experience suggests that even though employers may insist on courses which directly support the employee's work, it is possible in distance learning to design courses with optional assessment for it is clear that the intentions of many of the employees is to obtain certificates which can be cashed subsequently for a qualification.

OPERATIONAL MODELS

The approach in this chapter is to examine some existing models of distance learning systems and focus on the extent to which the institutions control the various aspects of the educational and administrative process. We then examine lessons derived from the planning and implementation processes and evidence about cost-effectiveness. The next section highlights the importance of collaboration to maximize use of human and physical resources and the final section looks at measures of success.

A. Levels of System Control

In this section the intention is to examine the extent to which differing distance learning systems are autonomous, typify them into four models and examine some of the advantages and disadvantages of each. The table which follows attempts to specify the level at which a sample of distance learning institutions determine their own features in respect of some of their functions. The classifications are not watertight, although usually the balance is clear, and in each case the government or some other financing body lays down overall budgets and parameters for the institution concerned. Nevertheless, decision-making at the level being considered is important in the context of the success of the institution in achieving its aims and in its ability to do this effectively. The size of each system in terms of student numbers annually is also included for reference.

Those familiar with distance learning systems will recognize that some major areas of activity have been omitted, e.g. Administration. This is primarily because most institutions do have administration under their control and the size of its operation is determined by decisions taken under other headings. Operational models therefore tend to fall

Table 6: Level of Autonomy of Distance Learning Program Establishment in Some of their Functions

Institution	Budget	Course Production	Local Support	Accredi-tation	Policy Making	Size
Allama Iqbal OU, Pakistan	i	i	i	i	i	l
Australia External Dept.	j	j	i	j	j	s
Belgium Flanders OU Proj.	i	o	i	o	i	s
China:						
CRTVU	i	i(most)	o	i	i(nat.)	x
PRTVU	i	i(few)	i	o	i(prov.)	m
France CTUs in Eastern France	j	j	i	i	j	s
Open College, Macau	i	o	i	i	i	s
Universitas Terbuka Indonesia		i	j	i	i	l
Open Tech Unit, UK	i	o	o	o	i	m
UKOU	i	i	i	i	i	x

KEY:
i – essentially decisions are taken internally by the "distance learning program" establishment.
j – decisions jointly taken with parties outside of the "distance learning program" establishment.
o – low, or no level of involvement in decisions.
s – small (5,000 students annually).
m – medium (5,000 -25,000 students annually).
l – large (25,000 – 100,000 students annually).
x – extra large (100,000 students annually).

into one of four categories – the Open Tech, UK model in which a separate central funding body is set up to promote open learning; a model in which the institution relies on an external input for a key area, e.g. Belgium and Macau; the mode in which a distance learning program is added to an existing institution and usually represents a minor part of its provision, e.g. Australia and France; and a model in which there is almost total autonomy on a national basis, e.g. AIOU and UKOU. The characteristics of each of them will now be examined.

The mission of the Open Tech program was to bring open learning into vocational education at the technician and supervisory levels to meet the changing needs of the labor market; to match the processes of learning to the interests and work of the student/trainee; and to stimulate the existing educational and training institutions to develop new methods for the commercial and industrial market. To accomplish all this the Open Tech Program was set up, not as a teaching institution and not as an assessment body, but as a funding agency. The idea was that, by offering project funds and selecting applications seen as meritorious within the aims of the program, it should be possible to use the pedagogic talent of existing educational and training institutions to put new life into vocational education. Almost no formal constraints are placed on the division of available funds. Educational institutions, examining bodies, industry, professional associations, can all bid for funds to support particular courses. Bids are considered on their merits depending on how they were seen as fulfilling the aims of the program. The selection procedure is carried out by an administrative organization called the Open Tech Unit. The Open Tech Unit, situated in the Manpower Services Commission, is headed by a Director and has approximately 30 staff who assist in the planning and monitoring of the 160 or so projects. In the Open Tech Program 11 types of organization undertook projects. The largest grouping (over one-third) was of educational institutions which, in general, provided subject-based courses in the open learning mode most frequently as distance learning packs.

A small number of organizations, about 10 per cent, fell into the category of employers and employers' associations. Work produced by them tended to be for the development of computer-based training. Thus a large car firm had support for the development of computer-based remote learning centers; in another program, an association of travel agents was provided with support to study how training might be undertaken on the terminals situated in the shop outlets. A trade union was provided with support to assist in the delivering of open learning materials to its members, and various industrial training boards were given support to provide open learning materials in their particular sphere of responsibility.

One major project was awarded to a validating body – the Business and Technicians Education Council. It was awarded a grant to produce a set of open learning courses, which it would validate, called the

Updating of Business program. Courses had such titles as *Supervising Word Processing*, *Managing the Office*, *Training and Coaching People*. They consisted of study materials backed up by in-company or local college support.

In the second phase of the development of the Open Tech Program there was a particular emphasis on the *delivery* of the projects described in the previous paragraph. A number of Local Education Authorities were given support for such activities and regional consortia were also formed. Examples of other organizations providing systems of course delivery are professional institutions and private training companies. Public and private training bodies represented about 30 per cent of the organizations delivering instruction. The particular courses and schemes, which have been developed, are summarized in Appendix 2. (See Blackburn and Smith for a fuller commentary.)[16]

The examples in which a major component of the distance learning system is imported from outside tend to be smaller institutions, though it can be said that the Chinese Provincial TVUs are of this type. In the Macau model, courses are derived from the other distance learning institutions in Australia, New Zealand and UK and the student's performances are externally assessed after internal marking. In one case, with the UKOU, this external assessment is a factor in allowing students of the Open College to count their credits towards a UKOU degree if they transfer to Britain. The Belgian case is similar except that at present they are using course materials from the Netherlands OU and having accreditation from them.

In the Australian and French models depicted, the aim of the external programs of existing institutions is to provide for those persons unable to attend lectures at the university, the opportunity to gain degrees or diplomas. These are usually the same as those degrees awarded for internal students to show that those distance students who succeed are on a par with the others. The arrangements take on a variety of forms and academic staffing policy, for example, can vary from those institutions who insist that normal academic staff should take on some load for external programs, to those in which staff are appointed who are dedicated to the off-campus program. In the French example, course production was shared out between the participating universities while students registered at their local university.

The autonomous model is typified by the UKOU though many other institutions have similar structural forms, e.g. the AIOU in

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[16] Blackburn and Smith, *Distance Learning for Technical and Vocational Education at Pre-University Establishment of Open Tech Type*, Studies in Technical and Vocational Education, UNESCO Press, 1986.

Pakistan and the STOU in Thailand. It has been analyzed in most general books on distance education with an early full description by its first Vice-Chancellor (Perry, W.).[17] It tends to have higher pro-rata staff complements in the different professions than other similar institutions and has a high retention rate for students. See Appendix 3 for the basic statistics of the UKOU. It has a unique partnership agreement with the BBC. Relatively higher academic staffing levels arise for two reasons. Firstly, because regional centers have full-time academics attached to them and secondly, because of the minimal use of consultants.

An advantage of the centralized autonomous model is that it can maintain strict quality control on its materials, on its presentation and on its local support. Constant standards of quality are most difficult to maintain in the Open Tech model and can be difficult in situations in the third model where the individual academic interests are divided between external and internal students or the same course. In this context the Macau model has the advantage that it can assess the quality of courses before it buys them. Some disadvantages of the centralized autonomous model are that, it is more difficult for it to get close to local needs, and its impact on developing new strategies in the educational sector as a whole, are more through individuals than institutions. These two aspects are those in which an Open Tech style of approach has more potential for success. A factor which can be an advantage for the centralized autonomous model is its cost-effectiveness but this requires a sufficient number of students on each course to make this reliable: when the target groups are too small then low-cost models of provision will be needed. A disadvantage of the distributed models is that duplication can easily occur which has the obvious effect of reducing overall cost-effectiveness although this was well controlled in the French case. Finally, autonomous institutions have the advantage of determining institutional priorities; when distance learning is just a part of the institution's wider provision, its budget, the priorities accorded by staff to its activities and concern for distance learning students' needs, can come under severe pressure in the normal policy-making processes of that institution.

B. Planning and Implementation of Distance Learning Systems

In the previous section we examined the level of control that different types of institution had over their major functions; in this section we look at some lessons for management deriving from the development of these and other functions.

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[17] Perry, Walter, *Open University, A Personal Account of the First Vice-Chancellor*, Open University Press, 1976.

We start with the institutional *launching process*. Even when educational needs are clear, and can be met by an open learning system, it takes strong and centralized political backing to launch such new enterprises. This has been true, for example, of the two national distance/open learning systems in the UK, each being launched by a government of a different major political party; and of the newer distance learning systems in India, Indonesia, Pakistan and Thailand. Perry (1976) provides details of the development of the Open University and Smith, R.C. (1982) for the Open Tech Program; the distance learning institutions of India, Indonesia and Pakistan also had backing at the highest political level at their inception.[18, 19] In cases where smaller groupings have been formed without significant national backing, as in the USA, the system has tended to falter. It is clear that a sound planning process is necessary at national level to launch such programs even though the eventual system set-up may be a highly devolved one.

To obtain political backing, it is necessary for the institution to have a clear mission. In the vocational arena, the drive for open systems has mainly been associated with the promise to support existing workforces by updating, or providing educational back-up for development programs of special importance when demographic expansion has put excessive strain on an existing education system.

Arguments for the use of distance learning systems to meet these demands mainly concern their flexibility and cost-effectiveness. Arguments against their use center on the isolation of the student, the difficulty of obtaining a rapid response to problems and the inherent difficulty of combining a demanding job with serious study. For educators the challenge of this area of work is that of linking new communications systems to the needs of vocational training in ways which are effective in terms of both cost and pedagogy.

We next examine the *production process*. By a conscious decision the Open Tech Program did not adopt the style of the course production system of the UKOU with centralized media production units but opted instead for a dispersed system funded by individual contracts. It is useful to examine this choice in some detail.

For audiovisual production the UKOU developed a partnership with the BBC. This was extremely valuable in the sense that here was a high quality production system with national outlets for the product. The Open Tech Program projects had to revert to a lesser level of

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[18] Perry, Walter, *Open University: A Personal Account of the First Vice-Chancellor*, Open University Press, 1976.

[19] Smith, R.C., The Open Tech Experiment, *Media in Education*, 1982.

audiovisual support with no public broadcasting in the first phase. There are indications that this may change in newer and expanded programs currently being discussed with the title of The Open College. The lesser level of audiovisual support is almost unavoidable when projects are local since the number of clients is too low to permit cost-effective operation. Internationally, difficulties with broadcasting authorities are common. They arise, sometimes, because broadcasting is controlled by a separate government department which has priorities different from those working in education. In other cases the difficulties are in the differing professionalisms. Broadcasters have their own standards of presentation and are accustomed to a freedom of action in program-making which may conflict with the needs of educators. It is useful to have clear well-defined arrangements on these matters from the outset regarding where the formal responsibilities lie and a mechanism for resolving difficulties.

In the making of textual material it is usual for print design to be undertaken in-house with the printing itself being undertaken either in-house, or by companies working under contract, or by government presses. A mixture of the two is also possible and having an in-house capacity of about 10 per cent of the requirement is very convenient for any special printing or for printing materials required annually. There are few educational arguments about what this balance should be with regard to the printing but there are strong ones, for keeping design in-house for page layout and use of illustrations and diagrams can be as real a part of the educational communication as the structure of a television program.

Substantial changes in the economics of print production are now taking place. Desktop book production systems are increasingly common in the developed countries. These allow local printing matched to demand and, in principle, also allow editing so that course material can also be modified according to local demand. Whether such a possibility will come into common use remains to be seen for the problems of copyright may well prove more difficult to resolve than that of obtaining the financial resources needed for a conventional print run.

Perhaps one of the most demanding parts of the production process is associated with the provision of home experimental kits for those courses which need them. The specifications need to meet and match the educational aims of the course, often in a new way, since their realization in conventional institutions is normally in a laboratory context. There are the requirements for portability and robustness, for safety in the home and for pre-testing. All these implies a considerable load not only on the academics but also on staff who refurbish the kits each year. It also requires considerable warehouse space which is reflected in the data in Appendix 3.

The next matter concerns *getting to the clients or students* with information, materials and local support. Information about the availability of distance learning courses needs to be made available to potential clients in a more systematic way than is usual in conventional education where, for example, schools tend to be sources of information about university and college courses. If public broadcasting is used, it can perform this function effectively in combination with its pedagogic task. More generally, however, there is a need to undertake publicity through campaigns akin to those in commerce using glossy leaflets, directories of courses, conferences and so on. In this work target populations have to be identified clearly for the work to be cost effective. Typical questions are: should publicity for vocational courses be aimed at employees or employers or both and in what form?

In Pakistan, publicity was aimed directly at the general public through the press, radio and TV, and individuals were expected to apply themselves. In the Open Tech Program, almost three quarters of the projects planned to market to individuals with almost 20 per cent planning to cater for special groups. (In the Open University's programs for commerce and industry, employers are seen as much more significant target.)

Then there is the task of getting materials to the clients and this depends heavily on the efficiency and level of the delivery services within a country. The operational arrangements are sometimes surprising. In Indonesia, for example, students in the first phase are required to buy their materials at post offices rather than to have them delivered to the door. Some countries make effective use of telephones, but telephone tutorials are only possible in countries where the system is adequate and cheap. Even UK only uses this form of teaching in a modest way. There are alternatives. In a country such as Pakistan, radio will reach more recipients than television or telephone particularly if the courses are aimed at the agricultural sector. In system design it is therefore important to examine the level of ownership of the hardware before deciding to use new communication methods.

Study center location is vitally important to vocational students many of whom are not able to travel far and for whom accessibility is important. For this reason, in the Open Tech model just over half of the projects set up delivery systems which allowed students some choice over where and when they could study, the main locations being college, home, work or resource center. In Pakistan, the provision had the usual flexibility of a complete distance learning system though there were some constraints. In the course of *electrical wiring*, for example, there was a requirement to attend practical work at polytechnic schools on Friday morning, the holy day. In Japan and Korea, local study centers take the form of local colleges and have a significant back-up of audiovisual materials. In China, group activity, based in work units such as a factory or a bank, is the normal method of reaching students. The final requirement for getting to the students is an able and qualified individual who can respond directly to their needs. This can be a trainer in the factory, as in China; or an individual appointed to the institution on a part-time basis as in Pakistan. All such part-time staff need some training and in some cases, as in India, to obtain special qualifications.

The next aspect of distance learning institution that we look at is the *staffing pattern*. Staffing requirements for distance learning institutions differ from those of conventional universities or colleges. There are three primary sources of difference which relate to the unusual mix of professional skills, the use of part-time staff and the assignment of work priority.

Distance learning systems call for an unusual range of professional skills. To the requirement for conventional teaching skills must be added a requirement for expertise in the use of communications media, for production skills and so on. In consequence, the proportion of academic staff required can be reduced from the usual 70 per cent to perhaps 25 per cent of the total complement. Conversely, the proportion of administrative staff is increased, particularly if assessment systems are involved, and considerable numbers of editors, designers, audiovisual producers and printers are required. Support staff including secretarial and clerical, technical and ancillary staff, can amount to almost 50 per cent of the total complement. In summary, the distribution of tasks is more like that of many commercial enterprises than that of a university.

While the balance of professional input is unusual, so also is the balance of full-time and part-time staff or consultants. The best ratio is open to discussion and is a function of the institution itself. Most distance learning systems use part-time staff for direct student support either individually or through local institutions acting as agents. This clearly is necessary to provide local support for students though in some cases, for example in Canada, travelling study centers are used. By converting part-time staff loads to full-time equivalents, a very approximate measure of the total balance between the two can be obtained. In the UKOU this shows a rough equality between the two inputs.

In the Australian and Open Tech models the organizational base is local, so it is clearly possible for full-time staff to be allocated open learning activities as part of their normal task either at a college or in a company although some full-time staff may also be appointed.

A more contentious question is the use of part-time staff at course creation stage. Many institutions use such staff extensively, for example, Universitas Terbuka in Indonesia, and difficulties can then arise over the control of academic quality. Strong arguments can be made about the essentiality of ensuring that the main communications with students should have high pedagogic and technical quality, and that this must lie in the hands of the distance learning institution itself. In cases where existing staff are deployed on the distance learning the challenge is to train them in the new methodologies. In several Open Tech projects help was sought from outside.

This leads into the third aspect concerning staffing. When the open learning project is added into an existing institution, the tasks associated with its development may be added to the workload of existing staff though in some cases the same lecture notes are used for internal and external students. This can lead to conflicts of priority for the staff themselves and, unless the reward system within the institution rates open learning work on a par with other activities, it can mean that it takes second place. This is a matter which needs to be taken into account when different organizational models are contemplated. Some institutions, notably in Australia, have been very successful in combining conventional and distance teaching so this problem is one that can be solved if suitably handled.

Finally there are the *decision-making and management structures*. The decision-making structures are particularly difficult to generalize since they vary from the heavily committee-faculty-board-based structures of western institutions to those in which decisions are taken on a more hierarchical basis. Line management structures tend to be more consistent. In large institutions, the load on its Head is such that he needs two or three key deputies. Typically these individuals are associated with – firstly, the academic policy, course choice and quality; secondly, student policy and their concerns. A third may be involved with the resource allocation process. The size of the administrative operation and the production process required individuals of some seniority to be responsible for these activities and the regional network needs some clear reporting line usually with a director at the central site. As with any complex structure, the extent to which authority is devolved within or without the institution is an important matter to be threshed out at an early stage.

C. Cost to Whom and to What Benefit?

There are several levels at which this question can be answered. First at the national level where comparisons need to be made between the conventional and the distance learning systems. Then there is the cost profile of a distance learning institution which can help to answer questions, for example, about the cost-effectiveness of the different media. Then there is the question of what proportion of the cost is borne by the individual, the employer (if the student has one) and the state.

Several studies have been made of the cost functions for large distance learning systems as compared with conventional institutions.[20, 21, 22] Each shows the cost of the full-time equivalent student as less than in the conventional institutions when student numbers are large. In the UKOU, the factor is about 1/2, in the Japanese University of the Air the proportions are about 1/4, 1/3 or 2/3 of the national university, public university and day programs of private universities. But if degrees are considered to be a valid performance measure and degrees obtained from both systems are on a par, then the graduation rate, the proportion of a given year's entry who eventually graduate, is an important measure. In China this is c. 70 per cent, in Korea it is reported as 30 per cent. In Costa Rica it is less than 25 per cent and in the UKOU it is c. 55 per cent. For the outcome to be that there was a parity of cost with the national universities, the graduation rate would need to drop below 30 per cent in the UKOU and to 20 per cent in Japan. But degree holders are not the only, or in some cases the major, product of a distance learning and even in the UKOU, c. 40 per cent of those participating in its courses who are only taking them as a single course and who are not proceeding to a degree. It is possible, for vocational courses in particular, to undertake the cost comparison in relation to the training field. In the UK context for example, providing student numbers exceed 500 per course, the costs to the client are in the range $4-8 per student hour against an off-site cost of $15-20 per student hour. For those in work one needs to add in the salary cost and lost contribution to earnings for the off-site course. This considerably enhances the cost advantage to the distance learning mode. But then another issue arises. That is the viewpoint of employers concerning the charging policy by institutions which are in the main funded by government. Employers argue that their taxes contribute towards the cost of the public education system

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[20] Muta, "The Economics of the University of the Air of Japan," *Higher Education*, 1985.
[21] Smith, R.C., *A Comparative Study of Some Performance Indicators for a University, a Polytechnic and the Open University* (to be published), 1986.
[22] Wagner, "The Economics of the Open University Revisited," *Higher Education*, 1977.

and so at least the provision to them should be subsidized. Government argues that it is part of the development cost of products or services. As a result, considerable discrepancies can arise in the marketplace in UK although the winning pressure is generally towards full cost fees. Perraton (1982) draws attention to another aspect of comparative costs – the level of the course being offered.[23] Since staff costs are an important part of the educational budgets in the conventional systems, courses in this mode have a much higher cost at the university level than at the primary or secondary school levels. Distance education costs will vary less over this range so cost savings will appear greater at the higher academic levels which he evidences by analyses from Korea, Israel, Mauritius, Kenya and Brazil. Numbers of students need to be larger therefore in the school level to maintain a similar level of cost-effectiveness.

An interesting point to emerge from the study by Smith (1986) was that, when subject area unit costs were examined they varied between 72 per cent (Arts) and 133 per cent (Science) of the norm at the conventional university and 83 per cent (Arts) and 130 per cent (Science) of the norm at the Open University.[24] This shows that the introduction of a different teacher-student communication system does little to alter these relative costs though reducing the total costs in the way described above.

The second issue concerns the different profile of the whole integrated distance learning system. Analyses have been undertaken which show the following features. Academic staff costs can be down from the 60-70 per cent of the total budget that they represent in a conventional institution to 25-30 per cent in a distance learning system and that can include the part-time staff costs. If costs are allocated to the headings of teaching department costs, material costs, interactive teaching costs (tutorials and academic computer service) and overheads, including the administrative support systems, the UKOU analysis (Smith, 1986) shows that approximately 16 per cent is on teaching department costs, 21 per cent on materials production costs, including the BBC costs; 18 per cent on the interactive teaching costs and 44 per cent on overheads. Further details of this are provided in Appendix 4. This distribution of costs demonstrates clearly the need for large student or trainee numbers to improve cost-effectiveness, since essentially only the materials production and interactive teaching costs vary linearly with the student number, and these represent only 39 per cent of the total costs. The course cost profile can vary considerably and the basis for the allocation of high cost resource such as television should be well argued. As was indicated earlier, the relatively cheap audiocassette is held in high regard by students while television, which tends to be given an average weighting by students, also has a much wider impact on the public at large and the standing of the institution.

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[23] Perraton, H., *Alternative Routes to Formal Education*, A World Bank Research Publication, 1982.

[24] Smith, R.C., *A Comparative Study of Some Performance Indicators for a UGC-Funded University; a Polytechnic and the Open University* (to be published), 1986.

The extent to which the students pay a proportion of the costs of the institution is clearly a policy matter which needs to be resolved when the institution is created. In Japan, 50 to 60 per cent of the cost will be provided by the national treasury; presumably students will pay the rest. For the undergraduate program of the UKOU, the government provides c. 85 per cent of the cost but requires the special vocational and community education programs to be self-financing. But there are other costs for students in addition to the fees: cost of travel to local centers, or of books or the cost of a transistor radio or audiocassette player. In early years, the UKOU provided audiocassette players as part of a home experiment kit, but in 1973, both because of a squeeze on the University's finances and because our surveys showed that more than 50 per cent of our students owned them, we decided to assume that students would own their cassette player just as we expected them to own a television set. More recently, the question has arisen as to whether we can expect students to have videocassette players or microcomputers as these became more widely used but the danger is that if we follow this route, we will be excluding more of the already disadvantaged students. Over 40 per cent who did not accept the offer of a place in 1985 did so because they could not afford the cost and one can envisage that this could also act as a deterrent to participation in almost any part of the world.

D. Using Existing National Resources

By their nature, distance learning systems rely much more on resources already in the community for their educational process than do conventional institutions and this has advantages and disadvantages. Collaboration between educational institutions can produce its own benefits and it was a topic which received considerable attention at an International Conference in 1979 hosted by the UKOU.[25]

The first way in which a distance learning institution often relies on external resources is through the use of existing buildings and plant which improves their cost-benefit ratio. Thus, in Pakistan, polytechnic laboratories are used for practical classes associated with the distance learning courses and school, college and university buildings are used in many countries in the evenings for the face-to-face tutorials. The benefits can work in both directions. If the distance learning institution has a computer terminal outlet at the study center, this can be used by the host institution during the daytime. If the host institution already has VCRs, these may be used by the distance learning tutor and students, and if distance learning students are provided with a local library, this can be accessed by the day students and vice-versa. With well-run local arrangements, considerable mutual benefit can be achieved, but if the organization is weak, difficulties can arise about availability of materials and accessibility of equipment. This highlights the importance to the distance learning institution of having sound local administration.

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[25] Neil, M.W. (ed.), *Education of Adults at a Distance*, A Report of the Open University's Tenth International Conference, London, Kogan Page, 1981.

The second mode of reliance is on human external resources that already exist within a country and some facets of this have already been addressed in the previous section. Subject expertise needs to be accessible throughout the country for local students either through institutions or selected individuals. In China, for example, this can be the factory training officer: more widely college staff are used or veterinary doctors for a course on animal health. For most institutions these staff are drawn upon on a part-time basis. Centrally consultants are used for course creation although on the Australian model it can be said that there is no clear distinction between 'internal' and 'external' resources as in many cases the lecturers are presenting courses for both constituencies of students at the same time.

The third way of using existing resources is by negotiation and often commercial relationships. This is typically undertaken with the broadcasting agencies, printers and distribution agencies and the postal services. These activities can represent a considerable part of the expenditure and so it is important to spend considerable time and effort to get these interfaces right.

Collaboration, which can be defined as two or more independent institutions or agencies working together to achieve common education/training aims to mutual benefits, will be examined later in this chapter as one of the issues which arise when developing a system.

E. Measure of Success

What follows in this section are measures of success which those outside the institution tend to use. What is not included in the list though very present in reality, is measures of the extent to which the research work undertaken as a necessary back-up to a distance system provides a greater understanding of the learning process, provides new avenues for other teaching staff to improve their own teaching and provides a resource of printed books in a subject not previously available in the language of a country. This latter point is of considerable importance in developing countries.

The easiest outcome to measure is the throughput of the students. It is one of the economic facts that distance learning institutions need large numbers of students to justify their cost-effectiveness to their paymasters, so it is important for any head of such an institution to make this a first priority. The UKOU stabilized at about 60,000-70,000 undergraduates per annum although there are still more applicants than places for them. A continuing education program has 50,000 students/clients per annum and is growing.

The second measure is the acceptability of the graduates of a distance education institution. This looks promising from a survey undertaken at the UKOU which showed the occupational changes they had experienced and which they attributed to their OU degree. The table below indicates some of the results.

Table 7: Distance Education and Occupational Growth

		Importance of OU Qualifications		
	Experienced %	Crucial	Important	Not Important
Better pay, extra increment	45	40	29	31
Promotion	34	14	50	36
A new occupation	16	34	38	25
Became self-employed	2	4	26	67
Achieved managerial status	13	17	47	37

The table is based on a response rate of 72 per cent of 6,370 graduates selected at random.

A total of 69 per cent of all the respondents had experienced more than one occupational change and the responses overall are an encouraging performance indicator of a distance teaching institution. One factor, often quoted by employers in relation to their employees who are OU students or graduates, is that success in such an institution demonstrates also a high level of dedication. Another important performance indicator derived from the same survey was that OU graduates had a high level of acceptability for higher degrees at other institutions. Thus, over 38 per cent of OU graduates had used their OU qualification to gain entry to a course of study or research in some other educational institution. Of these 46 per cent were for Masters courses and 6 per cent for Doctorates.

The third measure is status. Other institutions in the country can be suspicious initially but involvement of their staff and premises in a variety of ways can often mitigate against this. Then the standing of the successful students with employers is important. In UK the fact that a student has undertaken further successful study in his own time is important to the employer and perception of the advantages of the distance learning method has led some employers to convert some of their own training to this mode.

The fourth measure is the quality of the materials and services particular for student success but also since the public exposure of print and broadcast materials leads to immediate judgments being made about the institution which are more difficult to make about other institutions since their teaching is unexposed to the general public. Maintaining quality is, therefore, an important matter.

The fifth measure of success is the extent to which a distance learning provision brings economic benefits to a country. Retraining technical, technologist and other professional manpower is already becoming a major activity in UK as there is recognition that the supply of manpower trained in, and aware of, the new technologies is insufficient. In other countries, the special needs to develop vast human resources can be met only perhaps through distance learning systems and it may have maximum input in the rural areas which at last will have access to more education and training by the new methods.

Finally, student reaction to their learning experiences is important for success. They can lead, or deter, others to follow in their footsteps. And, if remote communities can perceive that distance learning is an avenue by which they can access learning or training previously denied to them, this can provide encouragement to new students and a grassroots political backing for the institution.

ISSUES IN THE DEVELOPMENT OF A DISTANCE LEARNING SYSTEM

In the last Chapter the intention is to bring together some of the key issues which determine the shape that any distance learning system eventually becomes.

A. What is the Motivation?

This is the start of the process. Why is anybody thinking about distance learning? There can be a 'pull' situation when large demands for university education, say, are unmet by the existing provision as was in part the case in China and Indonesia or it may be a 'push' case where national governments are in favor of compulsory secondary education or technical updating and need the means to achieve it. Is the intention to find a short-term solution to a problem, such as a shortage of qualified school teachers or is it to be a long-term system which cannot only be able to respond flexibly to shorter-term needs but also provide a long-term base for an educational provision? Then there are often concerns that the quality of the education provided is declining as the quantity provided increases. Distance learning enables the best talents, pedagogic and subject, to be provided to a population. For planning purposes it is essential to be clear about the motives and to define the needs it will respond to and in what timescale. In summary the aims of any distance learning institution should be clear to the government and the people. The country case studies point to some examples as does a paper by Motilal Sharma.[26]

B. Nature of the Access

This is moving on from a national viewpoint to the perspective from the student or client. Are they already motivated or do they have to be motivated? The answer to this question determines the extent to which an informational and promotional network has to be set up and also has an impact on choice of media in that some, such as television, raise much more awareness than others and are more glamorous. It adds more generally to the care with which materials are presented to provide encouragement at crucial stages in the learning process and it can be important to so structure the provision and its attainments that the student feels he is a first class citizen rather than a second. By the latter point I mean that in the long term the product of the distance learning institution is accepted as on a par with those from parallel institutions by employer, by other educational institutions when they climb further up the educational ladder and that in general fellow students and their institutions have status.

Is the entry to the institution to be open? If not what will it be restricted by – numbers, entrance qualifications or as is mentioned later, costs? In distance learning universities the majority of students require qualifications. There is a notable exception, the UKOU, where the argument for not adopting the rule can be summarized briefly by the statement – 'provided the exit value of the qualifications is on a par with those from other institutions . . . , it is not concerned with the qualifications at entry except in an advisory and counseling sense'. This is one of the pillars of the institution and is unlikely to change. From the student viewpoint it can be important that the institution will recognize the previous achievements through credit transfer so this is another important point to study.

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[26] Sharma, M., *Distance Education*, Manila, Asian Development Bank, 1985.

In several Asian countries it is possible to obtain degrees through the private students route in which effectively the student interacts with a university only through taking an examination there. The traditional universities have perceived distance learning universities as alternatives to this private student system, which many believe has brought degrees into disrepute, and which can then be abolished.

What are the physical circumstances of the student? Is it to be group learning in the workplace as is mostly the case in China or is it to be individual learning as in Pakistan and Thailand? In the latter case questions arise as to whether the home environment is an appropriate place for private study, whether any local resource or study center is easy to visit, and what home-based receivers – radio, telephone, television – are available.

In summary how will the target groups access the provision and why.

C. Nature of the Provision

In this section questions are raised about the provision from the pedagogical viewpoint first. For example, the local interaction between student and tutor, or group leader – is this to be compulsory or is it to be optional? Should purpose-built study centers (for up to 10,000 students in one in Korea) be built? These are becoming like local colleges and in China also provide residential buildings. In effect a new college network is being built based on a central provision of course resources with registration also taking place there. If they are used during normal working hours also they will start to present the same problems for adult students that full-fledged distance learning institutions are trying to avoid.

When working with other government and non-government agencies the distance learning agency may not make the whole provision. For example, if the other agency already has a comprehensive training network, as with industry or health services in more developed countries, the role of the distance learning agency can be to provide the resource material while the personal contact, or tutor component is undertaken by the other agency. This can integrate existing resource networks effectively and has the additional advantage that the trainers can themselves be trained in the new methodologies. This should be of benefit in the Asian context with existing networks of agricultural extension workers, or primary health care workers but, although some achievements have been made in Pakistan, the author is not aware of any major schemes. The causes of this are always difficult to specify but they appear to be based often on the difficulty of different government departments being able to work successfully together, a problem not uncommon in other parts of the world.

In degree-awarding institutions, the policy regarding student choice of courses and the allowable ways of putting them together is an important issue. Firstly, the element of choice of syllabus can be different. In Australia because most courses match internal ones, the choices are fairly clear at the start. In Indonesia too the course creation follows established national patterns of curricula so that a student, once he has started on a program, follows that study line consistently. In Pakistan and UK the student has a wide variety of choice with few restrictions or combinations that can be taken. The advantages of the more fixed curriculum system are that it is easier to organize, simpler to prepare and standards are more easily recognized. Its disadvantages are that it is more difficult for a student to select those courses which match his own background and needs, more difficult to try out new subject areas or change if difficulties occur, and more difficult for academics to introduce innovation into the system. There should be no illusion however about the administrative complexities which the more open system implies when tens of thousands of students make choices, which will also depend on exam results, though that number is statistically large enough for planning figures to be used in a reliable way.

Media mix is another aspect to which considerable attention was paid with regard to its effectiveness in the educational process described earlier. The principle was to maximize the strengths of the different media in the context that more different media implied more effective learning. This pressure is balanced by the hardware accessibility and costs, and ability to set up and maintain delivery systems.

Perhaps the most important issue of all is the quality of the products and services of the institution. The quality of the graduates and their degrees has already been mentioned and the conventional ways of checking these are reasonably well known. It should be added however that there is a quality which is often recognized additionally in distance learning graduates, that is the quality of persistence and dedication, for this particular route for adults often accompanies a family and a working life. Quality control is important in all the steps of the process, for both materials and presentation are much more public than is the norm and this must apply to non-qualification programs also. This is particularly true for national institutions that are breaking new ground. For the UKOU for example, the organizational structure which emerged had a strong emphasis on the quality control of its material and its presentation. This emphasis was displayed at all levels: course team, discipline, faculty, regional office and senate. Other institutions and their staff were necessarily involved in OU work through broadcasting, examining, tutoring and consultancy and fulfilled both a monitoring role and were monitored. In early days in particular there was an ethos which required the institution to prove that its teaching methods were effective and its standards proper: an attitude which also applied to administrative and operational staff who were also determined that the production, delivery and administrative systems should be highly efficient. In general, quality control is of much greater importance in a distance learning system than in a conventional one though moves are now in hand to improve the latter.

D. Resource Policies

Most aspects of resourcing can be translated into money but in this section I will look at three resource issues which arise – the direct one of how the institution or project is to be funded, the human resources and the physical resources.

Most national distance learning systems are financed by government in some way though not all their programs are. The proportions may differ. For example in the Korea Air and Correspondence University 40 per cent is paid for by Government with the rest being provided in the form of student fees. In Japan c. 55 per cent of the costs of the University of the Air are borne by the national treasury and in UK, it is c. 85 per cent from Government for the undergraduate program but the updating program is supposed to be self-financing. Student fee policy therefore is an early issue to be resolved. Clearly if the student fee income is set to be the larger proportion of the cost, the resulting high fees may well have the effect of deterring those at whom it is aimed. On the other hand, it is usually felt that students should pay something towards their courses so that they can demonstrate a commitment to their study and there is a motivation, in having paid for something, to get full value from it. In cases where a full cost fee policy is adopted, and this is usually in a sector where the courses are related to employment (though this is not always true as in the case of the Community Education and Cultural Education courses at the UKOU), there can be a difference of opinion arising between the employers and the government for the former will argue that they pay taxes for public services and why should they pay twice.

Finding the human resources can present its own problems. Generally the subject expertise is available though there are exceptions in emerging fields of study. Then distance learning can enable many more to access these experts than would otherwise be the case. It is less likely however that the subject experts are trained in the new approach or that sufficient instructional designers are available for the new system so that, in the initial phase, it is useful either to train those appointed in the new skills or to select individuals who are already instructional designers or who are selected for training in this particular expertise. In the longer term, in centralized institutions with full-time academic staff, these do become trained but, if the policy is to minimize the number of full-time staff, then instructional designers are likely to be needed as part of the team for all new courses and projects. This brings us to the balance between full-time and part-time staff. As has been mentioned previously, few institutions if any have full-time personnel for the local face-to-face activity. This is undertaken by individuals or institutions on a part-time basis. The first place in this hierarchy where full-time academic staff occur is in regional offices. They in part perform a monitoring role but not all systems have adopted this practice. Opinions differ widely on the extent to which part-time consultants should be used to prepare materials. Those in favor argue that this external expertise is needed to cover all the necessary subject areas, that it is cheaper, and that professional instructional designers can turn their work into good learning material though disagreements have occurred about who has the final decision about content. Those against argue that the whole process of creating materials for distance learning students requires the academic authors to be fully immersed in the process and that consultant's work, while expert, does require some 'subject tidying up' for teaching purposes as well as the instructional design input.

The remaining human resource needs of distance learning institutions do include professionals in the fields of audiovisual producers, editors, print designers and library but the largest cadre of staff is of a secretarial or clerical type in autonomous institutions with considerable numbers of administrators and managers. It is the last category of staff which can present recruiting difficulties in developing countries at middle management levels. By these is meant a supervisory cadre of staff who would be responsible in regional offices for ensuring, for example, that students were allocated to tutors, study centers were booked and available, that tutors were being monitored properly and at the center for keeping course teams to schedule, for ensuring that print arrived in the warehouse in time for distribution and so on. Efficient people at this middle management level are essential for the smooth running of the operation and do not always seem widely available.

There is an obvious saving in capital expenditure if the physical resources of existing educational institutions can be used out of normal hours, e.g. in the SITE program of India.[27] That is why face-to-face sessions usually take place in the evenings or weekends or at summer schools during long vacations. This can also mean that equipment can be used as well as the buildings. In centralized institutions, audiovisual production centers are provided on the site, though not always under the direct control of the institution, and some print capacity is provided. Warehousing and distribution facilities are normally required as is a substantial area for administration. In models where the national structure is a devolved one, such as the Australian and Open Tech model, and where the absolute numbers in each project are relatively small, there is little need for specialized buildings.

E. Nature of the Institution

Given that the motivation is known and the student circumstances and conditions well defined, the question arises as to what form the institution should take. The needs of the student will define the academic level at which it should operate but, if for example it is providing university level courses, should it also be allowed/encouraged to provide courses at other levels to make more efficient use of the network created? Answers to that are different in different countries, e.g. as is indicated in the Pakistan case study, the AIOU is used as a vehicle at all levels, from literacy programs through elementary agricultural courses to degree, including master's degree courses. The University Sains Malaysia program concentrates only on first degree students. If it is at university level, should it also be expected to undertake research and scholarship on a par with other universities in the same country? This was a crucial battle that was won by the UKOU in a country which has a binary policy in higher education with universities formally funded for research and polytechnics not.

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[27] Sharma, M., "Distance Education and Development," *ADB Quarterly*, October 1985.

But, more importantly, the choice must be made about the model to be applied out of those described in section 4.1 for, if for example, the 'add-on to an existing institution' model was selected, the attitude to research would be coincidental with that already existing in the institution and it would pass the research and scholarship test in its present form. Judgments also need to be made about the extent to which existing institutions and the resources within them could be modified to meet the new challenges and whether these resources are best exploited by direct involvement or through commercial arrangements. The 1974 Karmel Report on open tertiary education in Australia backed existing conventional institutions, and a few others, as the means of providing greater opportunities for part-time students and rejected the UKOU centralized model. In the UKOU case, the institution has extensive links with other existing resources in the country but mainly on a commercial basis. Thus it used other universities to provide summer school facilities, and hired many full-time staff from other higher education institutions on a part-time basis. It depends heavily on the BBC for production and transmission of programs, commercial printers for printing course books, the post office, for postal services and road transport agencies for transporting kits. It negotiates with Local Education Authorities for providing study center facilities (as well as educational institutions), public libraries for providing background reading and sometimes viewing facilities, publishers for guaranteeing the sale of set books and booksellers for stocking them.

Another question which arises is whether an institution will produce courses for credit or not, and in the former case whether it will have the power to award its own qualifications. If the former course is adopted, this can create a large academic and administrative load within the system and considerable resources will be required, particularly in the centralized model, to provide the formal assessment to the level expected by academic and administrative staff and students. Recognition of a new qualification is also another problem in early years (which does not apply in the Australian model) and in the UK it took perhaps five years to convince sufficient conventional academic establishments and employers that the OU was producing graduates whose academic performance matched the standards of graduates from elsewhere. The main disadvantage in not awarding independent qualifications is that the institution may be too closely tied to existing curricula and methods of assessment.

F. Collaboration

Collaboration is a much used word and does not always achieve the benefits that are expected of it. In-country collaboration can be very evident, e.g. with broadcasting agencies, and it occurs in particular when the distance learning activity is directed at a special target group, e.g. farmers, when collaboration with the agriculture ministry, extension workers and perhaps veterinary doctors becomes vital. There are cases when the collaborating agencies have a reasonable degree of complementarity. When attempts are made to collaborate with other educational or training institutions, it becomes more difficult. Experience, in general, suggests that institutional collaboration for course production comes under stress and breaks down because of disagreements about content; about academic attitudes in the text; about control; about copyright; and about finance, both expenditure on the project and income deriving from it. Collaboration is sometimes no more than an intention not to compete as in the French example where each institution agreed to produce a particular course in the program. Inter-country collaboration takes on several forms. The New Zealand Technical Correspondence Institute lists for example six modes – teaching of students in other countries at a distance, distance teaching by conference satellite systems, loans of experts, training of distance educators from other countries, visits of educational administrators from other countries for planning purposes and association with overseas aid programs. The UKOU finds itself collaborating in most of these modes and also, like the New Zealand Institute, in providing courses for user institutions overseas. The mode which is perhaps increasing the most at present is courses from one country being made available for students in other countries. For example, courses from Australia and New Zealand are made available in SE Asia supported, in some instances, by private companies, such as DISTED in Malaysia which act as a tutorial agency. On a wider field, despite several previous attempts at significant international collaboration which have not been resoundingly successful there is still impetus behind this idea. The Secretariat of the British Commonwealth is currently formulating proposals for a distance learning initiative to provide wider educational and cultural opportunities for Commonwealth countries whether large or small. Perhaps this is a thrust which the ADB can promote among its members to determine an appropriate model of a distance learning for its sphere of influence though it would need to take into account a wider range of languages as well as the social and cultural differences. Specific projects they could support would be a satellite for the region, a Regional Centre for system and course design and possibly the provision of some core course materials in health or agriculture with free translation rights between member countries.

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SAMPLE LIST OF POSSIBLE USE OF TELEVISION AND RADIO IN THE UKOU

A. Television

1. To demonstrate experiments or experimental situations, particularly:
   - (i) where equipment or phenomena to be observed are large, expensive, inaccessible or difficult to observe without special equipment;
   - (ii) where the experimental design is complex;
   - (iii) where the measurement of experimental behavior is not easily reduced to a single scale or dimension (e.g. human behavior); and
   - (iv) where the experimental behavior may be influenced by uncontrollable but observable variables.

2. To bring to students primary resource material, i.e. film or video recordings of actual situations which, through editing and selection, can demonstrate principles covered in the units. This material may be used for a number of purposes, for example:
   - (i) film of naturally occurring events (e.g. teaching situations, mental disorders, medical cases) to enable recognition of categories, symptoms, etc.;
   - (ii) film of naturally occurring events to enable students to analyze a situation, using principles or criteria established elsewhere in unit; and
   - (iii) to provide students with a selection of sources of evidence to analyze; besides contemporary material, it may also include archive film or historical material.

3. To record special events, experiments, species, places, people, buildings, etc. which are crucial to the content of units, but may be likely to disappear, die or be destroyed in the near future.
4. To bring to students the views or knowledge of eminent people, who are often prepared to be televised or filmed but not to write material especially for the institution.
5. To change student attitudes:
   - (i) by presenting material in a novel manner, or from an unfamiliar viewpoint;

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- (ii) by presenting material in a dramatized form, enabling students to identify with the emotions and viewpoints of the main participants; and
- (iii) by allowing the students to identify closely with someone in the program who overcomes problems or himself changes his attitudes as a result of evidence presented in the program or televised exercise.

6. To explain or demonstrate activities that the students are to carry out (e.g. home experiments, survey interviewing).
7. To feedback to students 'mass' or total results of activities or surveys carried out by the students themselves, where the turnaround time is too short for printed feedback.
8. To illustrate abstract principles involving dynamic change or movement.
9. To illustrate abstract principles through the use of especially constructed physical models.
10. To illustrate principles involving two-, three-, or n-dimensional space.
11. To use animated, slow-motion, or speeded-up film or videotape to demonstrate changes over time (including computer animation).
12. Through performance, to demonstrate methods or techniques of dramatic production, or different interpretations of dramatic works.
13. To demonstrate decision-making processes:
    - (i) by filming or observing the decision-making process as it occurs;
    - (ii) by dramatization; and
    - (iii) by simulation or role-playing.

14. To condense or synthesize into a coherent whole a wide range of information which, in print, would take up considerable space and would not provide the richness of background material necessary for students to appreciate fully the situation.
15. To demonstrate how basic principles have been applied in the real world, where visualization of the application in its total environment is necessary to understand the way the principle has been applied, and the difficulties encountered.
16. To test students' ability, by requiring them to apply concepts or

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principles learned elsewhere in the course; by explaining or analyzing real-life situations presented through television.

17. To demonstrate the use of tools or equipment, or the effects of tools or equipment.
18. To demonstrate methods of playing instruments, and the relationship between music, musicians and their instruments.
19. To increase students' sense of belonging; identification of and with course designers; to make the teaching less impersonal.
20. To reduce the time required by students to master content.
21. To pace students; to keep them working regularly; to break the inertia in beginning evening study.
22. To recruit or attract new students (either to the university or to specific courses); to interest general viewers in subject matters.
23. To establish academic credibility of the course to outside world.

B. Radio

1. To provide remedial tutorials, or some other form of tutorial, based on feedback.
2. To provide corrections, alterations or updating of material, where print remake budgets are limited, or where print cannot reach students quickly enough.
3. To bring to students primary resource materials, i.e. recordings which, through careful editing and selection, can demonstrate principles covered in the units. This material may be used in a number of ways, for example:
    - (i) recordings of naturally occurring events, e.g. political speeches, children talking, concerts or performances, talks previously recorded for other than Open University purposes (e.g. Reith lectures), eyewitness interviews at historical events; and
    - (ii) to provide students with a selection of sources of evidence to analyze.

4. To bring to students the views or knowledge of eminent people who can condense in a full or edited form, so as to provide the essential points, what in written form may be more complex or lengthy.
5. To record especially the voices of people who have not been recorded before, but whose contribution to the course would provide

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a unique experience (e.g. famous poets reading their own work, civil servants talking – perhaps anonymously – about their role in decision-making).

6. To change student attitudes:
   (i) by presenting material in a novel manner, or from an unfamiliar viewpoint; and
   (ii) by presenting material in dramatized form, enabling students to identify with the emotions and viewpoints of the main participants.

7. To demonstrate methods or techniques of drama or music, through performance.
8. To provide the student with a condensed argument, in lecture form, which may:
   (i) reinforce points made elsewhere in the course;
   (ii) introduce new concepts not covered elsewhere in the course;
   (iii) provide an alternative view to that presented in the correspondence text and/or television programs;
   (iv) analyze material contained elsewhere in the course, more particularly, in especially written broadcast notes or television programs;
   (v) summarize the main points of the block or course as far as it has gone, providing integration and orientation; and
   (vi) draw on quotation, recorded information, interviews, etc. as evidence in support of (or against) the argument.

9. To enable students to perceive that different points of view exist, and to observe ideas being challenged, through discussions and interviews.

Appendix 2

SUMMARY OF COURSES PROVISION ARISING FROM UK OPEN TECH PROGRAMME

The 1986 Open Tech Directory details 161 projects of which 112 are described as Materials Projects, 24 are described as Delivery Systems, 16 are described as Practical Training Facilities and 9 are described as Support Services. Over 850 separate schemes/courses are available within the 161 projects although a considerable number are courses of less than ten hours duration and some as short as one hour.

The distribution is as follows:

Within the Materials Projects Section:

- 29 courses in Agriculture ranging from 21 modules in amenity horticulture, e.g. on Types of Grass for Sport, Plant Identification, Safe Use of Chemicals, to the fishing industry, i.e. 12 modules on improving the economics of operating fishing vessels; and including grassland management and tree botany;
- 43 courses in Computer;
- 142 courses in Engineering;
- 9 courses in Health, mainly for nurses;
- 34 courses in Information Management, including Librarianship and Automation;
- 211 courses in Management Supervisory Skills;
- 117 courses in Manufacturing Industries, including Food (8), Footwear (17), Glass (8), Iron and Steel (5), Paint (6), Polymer and Plastics (9), Printing and Packaging (20), Textiles (44);
- 48 courses in Math and Statistics;
- 55 courses in Process Technology;
- 24 courses in Science;
- 61 courses in Service Industries, including Cleaning (1), Hotel and Catering (15), Retail Trade (7), Tourism and Leisure (4), Transport (34); and
- 45 courses in Training and Open Learning.

Delivery systems in the Open Tech Programme vary greatly in size. All provide advice on the choice of learning materials, and on study skills, tutorial guidance and assessment of progress, access to practical training facilities, and individual and self-help group discussions. The largest have 37 support centers while others have only 2 or 3. As yet, course delivery is patchy, but the aim is, eventually, to provide support centers throughout the country.

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Some Basic Statistics of the UK Open University

1. *Area of main campus at Walton Hall – 30 hectares (or 70 acres)*
2. *University Buildings*

Walton Hall:	m^2	
Academic	26,000	
Administrative and Operations	23,000	
BBC/OU Production Center	11,000	
Total		60,000
Regional Offices:		
Total		23,500
Warehouses (off main campus)		
Total		16,500
GRAND TOTAL		100,000

3. *Full-time Staffing Levels, January 1985*

Central Academic	455	
Regional Academic	220	
Course/Research Support	233	
Academic Administrators/Library	458	
Secretarial/Clerical	975	
Technical	147	
Artisans/Ancillary/Printing, etc.	213	
Total		2,701
BBC Staff		360
Grand Total		3,061

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4. *Part-time Tutorial and Counselling Staff*		5,200
5. *Undergraduate Statistics, 1985*		
New Students Enquiries	100,000	
Applicants	49,691	
Intake	19,366	
Finally Registered		13,870
Median Age – 32 years		
Continuing Students: Finally Registered		53,563
Total of Finally Registered Undergraduates		67,433
Female	45%	
Disabled	3%	
Those with educational qualifications lower than normally required for entry to conventional university	34.2%	
Total of Finally Registered Course Populations (Students may take more than one course)		80,535
Split between Arts and Science-based Courses	49/51	
Total who Passed Examinations		57,186
Number of Undergraduate Courses	133	
6. *Graduate Statistics, 1985*		
BA Graduates		6,550
Female	49%	
CUMULATIVE TOTAL		75,870
7. *Postgraduate Statistics, 1985*		
Total Students	943	
Part-time Research	531	
Full-time Research	162	
Taught Higher Degrees	250	

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8. *Continuing Education, 1985*		
Students on courses in the Programme		14,246
Course Packs Sold		52,351
9. *Summer Schools, 1985*		
Number of Locations		20
Number of Attenders		32,098
10. *Assessment, 1984*		
Number of Computer-marked Assignments		210,000
Number of Tutor-marked Assignments		426,000
11. *Operations, 1985*		
Number of Home Experiment Kits Dispatched		31,800
Number of Other Packages Dispatched		3,700,000
Number of Non-broadcast Audiocassettes Dispatched		380,000
Number of Transmission Per Year	TV	2,700
	Radio	900
Total Hours of Transmission Per Week	TV	36
	Radio	13

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OPEN UNIVERSITY ANALYSIS 1983 AND 1984*

SECTION C.1 UNDERGRADUATE TEACHING PARAMETERS
(Averaged over 1983 and 1984)

TABLE 1

			Unit Cost (rounded to nearest £ Sterling 10)				
Equivalent Academic Areas	Student Load in FTEs (Note 2)	Success Rate (Note 3)	Faculty (Note 4)	Teaching Materials (Note 5)	Interactive Teaching (Note 6)	Overheads (Note 7)	Total
Arts	8,584	76%	130	270	270	810	1,480
Social Sciences	6,776	74%	200	260	290	810	1,560
Mathematics	5,185	70%	210	280	430	810	1,730
Science	4,646	71%	550	590	390	810	2,340
Technology	5,158	68%	440	500	340	810	2,090
Education	2,362	68%	490	590	360	810	2,250
TOTAL/ AVERAGE	32,711	72%	290	370	330	810	1,800

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* Smith, R.C., 1986: A Comparative Study of Some Performance Indicators for a UGC-Funded University, a Polytechnic and the Open University (to be published).

Sources Used:
- Final Accounts 1983 and 1984
- OU Statistical Bulletins May 1984, April 1985, July 1985
- Working documents supported by discussions with senior staff

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NOTES

1. The figures are averaged over 1983 and 1984 primarily to take into account inflationary differences with the UGC year 1983/84. The trend in student load figures was flat, changing by less than 0.05 per cent in the total, although with a maximum change in faculties of 7 per cent (Science 7 per cent down and Technology 7 per cent up) which was matched by the converse change in the Faculty unit costs. The average unit cost was determined by averaging the unit costs calculated for each year.
2. Undergraduate students register on half-credit courses and full-credit courses and aim to collect six full-credits for a BA degree and eight for a BA (Hons) degree. The student load is, therefore, determined by the numbers of students registered on courses each year by academic area on the basis that a load of two full-credits is equivalent to a full-time student year. This does *not* include credits awarded for advanced standing and indicates that in this model, the Open University is equivalent to an institution with 33,000 undergraduate students on a full-time basis. These full-time equivalent students are spread across the academic levels at the Open University in the following way: 37 per cent at Foundation level, 45 per cent at Second level, and 18 per cent at Third/Fourth levels.
3. Each year on each course, both continuous assessment and final examinations are used for student assessment. These success rates represented therefore, are based on the number of actual certificates awarded each year.
4. The Faculty costs include the following:
    a) After deduction of research staff salaries, 70 per cent of the central academic staff cost.
    b) From academic staff of the Institute of Educational Technology, 60 per cent of their cost divided equally between the six faculties.
    c) 70 per cent of the residual expenditure by faculties (defined as total faculty expenditure less specific research expenditure less academic staff costs).
    d) From maintenance of premises, the costs were attributed on the basis of the number of square meters of area with a weighting for fuel costs depending on nature of use.
    e) From the library, the costs are attributed to faculties and other

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areas on the basis of the distribution of library resources and time, with 70 per cent in each case attributed to teaching.

5. The Teaching Material costs include the following:
   a) BBC and other audiovisual costs. These costs were attributed on the basis firstly, of management estimates of the relevant loading of audio and audiovisual production and of transmission; and secondly, of relative allocations of programs during the period considered. The trend was checked over the other years to obtain a best estimate.
   b) Print costs including design, editing, postage and storage estimates.
   c) Home experimental kit costs.
   d) General course budgets which include the costs of consultants, copyright clearances, photographic work, travel, etc.

On average, the BBC and audio-visual costs account for 60 per cent of this component; print costs – 23 per cent; home experiment kit costs – 6 per cent, though in the Science and Technology faculties the kit costs can rise to the 15 per cent level; and course team budget costs – 11 per cent.

6. The Interactive Teaching costs include the following:
   a) Fees to part-time tutors and counsellors as payment for marking and tuition and counselling services. On average, this is c. 65 per cent of this component.
   b) From staff tutors, who are faculty-related regional academic staff – 90 per cent of their cost; from senior counsellors who are student-related – 90 per cent of their cost distributed between faculties on the basis of proportions of student FTEs. On average, this is c. 25 per cent of this component.
   c) Academic Computing Service costs primarily in the Mathematics faculty.

Distance Education in Asia and the Pacific

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INTRODUCTION

This paper is broadly divided into five sections. The first section contains a brief analysis of educational developments in Asia and the Pacific region related to distance education. Section II deals with the concepts of distance education. The third section gives an account of the current status of distance education in a number of countries in the region. It also contains descriptions of various program activities in distance education carried out by UNESCO Regional Office for Education in Asia and the Pacific (ROEAP), specifically in two areas – higher education and teacher training. The fourth section attempts to identify some key problems and issues and Section V contains the concluding remarks. The paper also includes a bibliography.

It must be mentioned that the paper draws its substance from the UNESCO publications which were available in ROEAP's Library and Documentation Centre.

Lastly, the views expressed in the paper do not represent UNESCO's views.

THE EDUCATIONAL SCENE[1]

The recent decades have been in Asia and the Pacific, as in other parts of the world, a period of growth and development in education unparalleled in magnitude and reach. This section briefly describes some trends of educational developments in the region, particularly distance education.

A. Demographic Context

When one talks about education in Asia and the Pacific, what inevitably appears in one's mind is the sheer size of its population and the large numbers added to it each year. Today, some 3,000 million people, almost two-thirds (63 per cent) of mankind live in this region. This population is expected to reach almost 3,800 million in the year 2000 – an estimated net increase of around 50 million per year.

The high rate of population growth has cast a heavy burden on the resources of the developing countries for education. For example, it is estimated that schools must be increased by as much as 50 per cent just to be able to maintain the existing primary enrollment level in the developing Asian countries (and the existing level is well short of full enrollment).

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[1] Singh, Raja Roy, *Education in Asia and the Pacific*, Bangkok, UNESCO, 1986

Another notable characteristic of the population in the developing countries of Asia and the Pacific is the high proportion of young people under 15 years of age. In absolute numbers, there are presently over 1,000 million children and youth under 15 years of age in Asia and the Pacific. Providing educational opportunities to this mass of young people is likely to remain a major concern in educational policy for the coming years.

The developing countries of Asia and the Pacific are seen as predominantly rural in terms of population distribution as well as the characteristics of their economies. About 72 per cent of the population in developing countries of Asia are in rural areas and only about 22 per cent in urban centers. The percentage of urban population in individual countries varies from 5 per cent to 90 per cent.

This picture is changing fast. There is a rapidly expanding internal migration, carrying every year millions from villages to towns, and from smaller towns to big cities. Coupled with this, the rapid pace of urbanization in Asia is reflected in the growth of large cities where population is doubling about every ten years: Bangkok, Bombay, Calcutta, Jakarta, Karachi, Manila, Seoul, Shanghai and Kuala Lumpur. The migrant population in the first generation is predominantly the younger group (18–45 years). The kind of educational background that they bring with them would be vitally important for their adjustment to the urban environment and also for their productive contribution. This distribution of educational facilities will also be affected such as in the demand for teachers and school premises. Population – its size, rate of growth, composition and mobility – is a vital factor in the educational development policy of the developing countries of Asia and the Pacific.

B. Education and Quality of Life Profile

There are extreme variations in educational attainments in the region. At one end of the range are the industrialized countries (Australia, Japan, New Zealand and USSR) which have educational levels that are among the world's highest; at the other end are countries where the vast majority of the population have received no schooling and illiteracy is pervasive. Between these two extremes lie countries such as Fiji, Republic of Korea, Philippines and Sri Lanka where 80 per cent or more of the population have been through school. Thus, there are the remaining countries where between 20 to 60 per cent of the population have not received any schooling. Low levels of education go with sharp disparities between urban and rural population, between the economically advantaged and disadvantaged groups and between men and

Table 1: Population profile: Income, poverty, life expectancy, educational attainment (selected countries)

Country	GNP per capita 1983 (US$)	Percentage of population below poverty line (1975)	Life expectancy at birth 1983 (years)	Estimated adult literacy rate 1985 (%)	Percentage of the population having attended			
					No schooling	Primary school	Secondary school	Post-secondary
Bangladesh	130	64	50	33	82.3	10.0	6.9	0.9
China	300	–	67	69	44.5	32.7	21.7	1.0
India	260	46	55	44	72.5	11.3	13.7	2.5
Indonesia	560	–	54	74	41.1	48.4	9.6	0.8
Malaysia	1,860	12	67	73	43.4	42.6	13.9	——→
Nepal	160	–	46	26	41.2	29.4	22.7	6.6
Pakistan	390	43	50	30	78.9	8.7	10.5	1.9
Papua New Guinea	760	–	54	45	82.6	13.2	4.2	——→
Philippines	760	33	64	85	14.1	57.6	16.4	11.9
Republic of Korea	2,010	8	67	94	19.7	34.5	36.9	8.9
Sri Lanka	330	14	69	87	17.8	50.5	29.4	2.3
Thailand	820	32	63	91	20.5	69.7	6.8	2.9
Turkey	1,240	–	63	69	39.7	45.1	13.1	2.2

women. Table 1 brings together for selected developing countries some data illustrative of the interrelationship.

C. Enrollment Trend

Between the 1960s and today, a great surge in the expansion of education has taken place. Enrollment at all levels grew from 263 million in 1960 to 522 million in 1982 – doubling in 22 years. As between the three levels of education, a trend was discernible towards higher rates of growth at the second and third levels and this is likely to continue. But one noticeable characteristic is the range of variation among the countries, not only between the industrialized and the developing countries, but among the developing countries themselves.

Although the situation of girls in terms of their enrollment at all levels of education has been improving, further progress particularly in the southern Asian countries (Afghanistan, Bangladesh, India, Nepal and Pakistan) will require the determined and consistent action of their respective governments.

Universalization of primary education has now been accepted by many governments in the region as a priority objective. The effect of this renewed commitment to the provision of primary education for all children is beginning to show. Nevertheless, taking the region as a whole, the current shortfall in universal primary education means that 60 million children of primary age group are not enrolled.

In absolute numbers, total enrollments in the second level of education in the region rose from 95 million in 1970 to 148 million in 1982. Aggregate regional figures show that the disparity between the male and female enrollment has been somewhat narrowed in some countries. Another trend is that secondary education is now reaching out to the rural areas and the number of pupils drawn from the rural areas is rising.

Traditionally, the main avenue of access to second level education has been through primary education. In recent years, other paths of access are being thought of to facilitate entry into second level for those who have prepared themselves outside the structures of formal school systems. Communication technologies have offered new opportunities via distance learning techniques. While their total output may not yet be a significant alternative to the formal system, their potential for contributing towards the creation of a wide base of educational opportunities is very great, bearing in mind the resource constraints of the developing countries.

D. Teaching Personnel

With the exception of a few countries, the expansion of enrollments in Asia and the Pacific is not matched by an expansion of the teaching force. In most countries, however, the number of teachers, who are professionally untrained has decreased appreciably even though the backlog of untrained teachers may be quite high in some of them. New entrants to the teaching force are professionally qualified, but exceptions occur in countries where educational services have to be carried into remote areas for special population groups.

It is not only the number which is important. Profound changes in teachers' tasks and working conditions are taking place which affect their status and initial and continuing training. In all countries there is urgent emphasis on qualitative improvement in education; new subjects are being incorporated into the curricula; new assessment procedures have become necessary; schools are assuming new social responsibilities in the developing countries involving relationships with local communities. In the context of these developments, the tasks of teachers tend to be diversified, calling for effective, continuing training programs. Such training programs call for non-conventional approaches.

Recent developments in personnel training policies arise in three areas. Firstly, with new developments in the various disciplines and technologies, the upgrading and retraining of teachers and educators has become more complex, calling for skills and knowledge of a wide range of experts. Their preparation and training now make demands on the training institutions for which they are not equipped. The third area lies in higher education, which traditionally has had no "staff training". Increasingly, the need is being felt for appropriate staff development at this level.

E. Out-of-School Children and Youth

Today, more than 350 million children and youth aged between 6 and 23 years are outside the formal education system. This roughly accounts for 60 per cent of the total population within this range. As compared to the situation two decades ago, the absolute number of out-of-school children and youth grew by more than 100 million. The critical section is that of young people who are beyond the primary school age but not enrolled in school. The education and training of these young people are vitally important because of their potential contribution to national development. Educational programs fall short of the needs. This is an area where alternative approaches in the delivery system is worth exploring most.

F. Higher Education

The main challenge in the coming years will be how to cope with students at the tertiary level. With the increase in numbers, the demographic and social composition of the student population has changed. In several countries the rate of expansion has outstripped the resources (teachers, classrooms, etc.) needed to maintain the system despite the fact that higher education has been receiving a large share of financial resources of the education sector.

Different population groups have different levels of access to higher education and their rates of participation and levels of attainment also vary sharply. Inequalities arise because of race, sex, age, socioeconomic background, culturally-biased entrance examinations and geographic location. Statistics show a striking disparity in the participation rate of women in higher education in most of these countries. The other phenomenon is that the universities are concentrated in the urban centers or in more developed areas.

The problem is complicated by two other factors. First in the developing countries, the progress of structural diversification has been very slow; much of higher education is concentrated in the universities. Other institutions offering diverse educational opportunities through short cycle studies particularly, in the context of continuing education, have not grown on an extensive scale and account for a relatively small percentage of third-level enrollment.

Higher education policy in a number of countries stressed on narrowing the gap between educational opportunities (access, participation and attainment) of the rich and those of the poor, and among the various regions and groups of people through a more equitable distribution of resources and facilities. Many innovative measures have been tried. One such is establishing open university structures, using the distance teaching mode. Australia and New Zealand have had distance systems at various levels for a long time. In recent years, Bangladesh, China, India, Indonesia, Japan, Republic of Korea, Sri Lanka and Thailand have set up open universities or distance teaching instruction at the higher education level.

To summarize, educational systems have in the last three decades expanded on an unprecedented scale. Young people have many more opportunities for education than they had in the past. Yet the problems are also massive, both quantitatively and qualitatively. The educational reforms in many countries attest to the persistence of these problems. Countries are now faced with the complex task of dealing simultaneously with rapid educational expansion and the reshaping and revitalization of their education systems. The complex task is to be carried out in a context in which resource constraints are becoming more severe. This obviously calls for innovation and improvement in the educational delivery system. The question is who should be served by the education systems, by what means and to what purpose.

DISTANCE EDUCATION – WHAT IT IS[2]

There are many definitions of distance education. D. Keegan analyzed a range of definitions attempted by eminent authorities. He concludes that he is attracted to B. Holmberg who offers the proposition that distance education is any one of the various forms of study which are not under the continuous, immediate supervision of tutors present with their students in lecture rooms and that it includes all that teaching methods in which teaching is conducted through print, mechanical or electronic devices.

The world generally understands distance education to mean the separation of teacher and student based on the self-instructional principle. It also entails the use of a range of media to enable the learning process to take place.

Distance education is not altogether a new phenomenon. It has a long history that began during the last century. A number of institutions, including private business firms, in both the United States and the United Kingdom began to teach using printed correspondence materials. Soon after the turn of the century a number of large universities also began to teach by this mode. These included the University of Queensland in Australia, followed by the University of New England.

Teaching consisted largely of printed notes supplemented by face-to-face classes, either at remote study centers or at on-campus residential schools. In the early post-war years there was some growth, but it was not until the 1960s that an escalation began.

In recent times, distance educators owe a lot to the Open University of the United Kingdom (OUUK). It is not that its organizational or educational models are necessarily appropriate for the rest of the world nor even that its teaching methods are adaptable to other nations, what the OUUK did was to legitimize teaching at a distance. The University proved that it could be done as efficiently and effectively as at conventional on-campus teaching institutions and at a cheaper rate and that the end product was acceptable in the market place.

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[2] a) Taylor, James C. and White, Vernon J., "Why Distance Education." *Distance Education, Bulletin of the UNESCO Regional Office for Education in Asia and the Pacific*, Bangkok, UNESCO, 1985.

b) *Distance Learning System and Structures Training Manual, Vol. 2 (trial edition)*. Report of Sub-Regional Training Workshop on Distance Learning System and Structure, Bangkok, UNESCO, 1984.

c) Taylor, James C. and White, Vernon C., "Media Links in Distance Teaching in Higher Education." *The Use of Advances in Communication Technologies for Higher Education Purposes*, Report of a Technical Working Group Meeting, Bangkok, UNESCO, 1986.

d) Adams, R. S., Bewley, D. R. and Povey, T. A., "Advances in Communication Technologies for Improving Educational Methodologies and Practices in Institutions of Higher Education."

Almost simultaneously with the OUUK project, institutions in other European countries, North America and Australia, began to expand rapidly into distance teaching. Then Asia, Africa and South America joined in. The question is: Why this upsurge of interest?

A. Why Distance Education

Access and Equity: The answer is that distance education showed that it could provide educational opportunities to large numbers of people who had previously been denied such opportunities, and that it could be done in a cost-effective manner. That is the essence of the answer to the question: Why distance education? It is not that it enables new technologies to be used and it is not that it is a cheap method of teaching. It is that it has provided access to learning to many people, and not at excessive cost.

The developing countries have found in distance education an answer to the previously also insurmountable problem of how to take education to the large number of their population who are isolated geographically. But equally, developed countries have found distance education to be the way to take education to their urban isolated, the people in cities who, for one reason or another, cannot attend on-campus classes. And both developed and developing nations have found distance education to be the way to take education to the socially isolated and disadvantaged.

Taking education to disadvantaged groups is no easy task. Generally speaking, people in such groups lack confidence in their own ability to learn. One of the obvious manifestations of this lack of confidence is a reluctance to participate in face-to-face classes where they feel their shortcomings will be exposed. In fact, many will refuse to participate in an education program for these reasons.

However, distance teaching techniques enable people to undertake a course of study in privacy. Thus they can learn at their own pace and take refuge in the fact that they can succeed or fail without the fact becoming public. Many of these people, when they have achieved some success, and when they have gained confidence, may elect to transfer to the face-to-face mode. But their confidence in and urge for education is gained through distance education.

It sometimes seems to be taken for granted that distance education is synonymous with adult education. This is the 'second chance' university syndrome concept, initiated by the OUUK, that distance teaching institutions are for adults who have missed the chance of attending a conventional university in their youth.

Most of the adults to whom the open universities were intended to cater were not expected to have attained the qualifications necessary for entry into conventional on-campus institutions. Thus the words 'open university' appear, to many minds, to be synonymous with unqualified adults. But this need not, and should not be the case. Distance teaching techniques can be used to teach people of all ages, and to teach courses from a wide range of disciplines.

It is often argued that the distance teaching mode is only suitable for adults, that something happens at 21 to 23 years which makes the students susceptible to distance teaching techniques. There is no evidence to prove this, indeed, there is much evidence to refute it. Students in remote areas in Australia have been taught successfully at a distance from the beginning of their primary schooling.

It is also argued that only a limited number of discipline areas can be taught at a distance. The classic argument is that medicine cannot be taught externally. Perhaps not all of it can be, but a great deal of it can. Another of the "difficult" disciplines, engineering, has also been taught successfully at a distance.

Thus, distance education techniques can be used to teach a variety of courses, across a wide range of disciplines. The basic necessities are that the student be motivated to learn, and that the instructional material be well designed. Most instructional techniques available to distance education teachers are multi-functional and may be adapted to a variety of objectives, learners and course discipline areas. But the instructional packages must be functional. What matters most is the efficacy of the instructional treatment contained in the instructional message.

If radio is the only teaching medium available in a country because of poor ground communications, it can be developed as a most effective teaching medium. The requirement is that the teaching sessions be well structured to instruction, and that the students be well motivated. Of course, the problem is that not all students are highly motivated. Thus it will always be better if a range of distance teaching techniques are used, provided they are available.

If one considers the large number of institutions in the region and indeed around the world currently expending resources on distance education programs, then one must presume that distance education is a viable process. For example, the recent directory of resource materials used in distance teaching by higher education institutions in the Australia/Pacific region that was compiled by the UNESCO Regional Office for Education in Asia and the Pacific (1984), highlighted the fact that 34 institutions of higher education in Australia, India, New Zealand, Pakistan, Sri Lanka and Thailand were heavily involved in distance education. We may add China, Indonesia, Republic of Korea to this list. The level of courses ranged from Associate Diploma to Diploma, Bachelor's Degree and Graduate Diploma and Master's Degree level courses in a wide range of subjects, drawn from practically all disciplines. Distance education courses in the region are currently available on subjects as diverse as Biological Aquatic Resource Management, Digital Electronics, Civil, Mechanical and Electrical Engineering, Surveying, Education, Computer, Prehistoric Archaeology, Economics, Psychology, Sociology and a wide variety of language subjects. Evidence for such a massive investment in distance education in such a wide range of contexts suggests that distance education does in fact work.

B. How Cost Effective

There have been a number of studies done on the costs of teaching at a distance, and some data are available on its effectiveness. But very little has been done towards putting the two parts together and formulating a cost-effectiveness study of distance education. Further, the little that has appeared has inevitably referred to distance teaching in developed countries.

There appears to be an almost unanimous belief that distance teaching is cheaper than on-campus teaching. Of course distance teaching can be as cheap or expensive as is desired. But a distance teaching institution with prepared well-structured instructional packages using a variety of techniques, and which provides good teaching and administrative support to the student, can apparently operate at a lower per student cost than conventional institutions.

Distance teaching becomes most cost-effective when large numbers of students are involved. It costs no more to prepare and present an educational radio or television program for a small group of students than to a very large group. Once a set of printed instructional materials is prepared, multiple copies can be reproduced and distributed to any number of students. The larger the number, the smaller the preparation cost per student. Also, the reproduction costs, such as printing, will fall because of economies of scale. One area where there are few economies of scale is the interactive teaching part of the system. It takes almost twice as long to mark 200 assignments as it does to correct 100. Nonetheless, because of the economies of scale available in the preparation and reproduction phases, and sometimes in delivery, the distance education mode of teaching has enormous advantages for developing countries. It can be a highly cost-effective way of teaching.

C. Media

A wide range of media is now being applied to the operation of distance education. In the field of distance education, one finds the traditionally predominant print medium supplemented by radio, broadcast television, audio and videocassettes, teleconferencing as well as teletext and view-data systems among others. Should such a proliferation of media replace traditional media, or should they be used to supplement existing systems? Is there likely to be a sufficient improvement in operations to warrant additional expenditure?

Printed materials seem likely to remain the core medium of distance education for some time to come in spite of the emergence of electronic media. Provided printed materials are designed and produced in such a way as to make students active learners (by including learning activities and related feedback in the form of self-assessment exercises, for example), they can constitute a very powerful instructional medium. Further, printed materials have certain advantages over electronic media: they are relatively cheap to produce, and they can be used by a majority of adult students in many parts of the region. The instructional efficacy of this traditional medium is further enhanced by its practicality, since it does not require a power supply in use, unlike the range of electronic media.

Radio broadcasting requires technical and instructional expertise plus studios. There is also the need to plan production schedules well ahead. The student is bound to a fixed listening time and must be in possession of receiving equipment, and, unless the student is prepared to tape the broadcast, the message is transient. However, radio can overcome the problem of distance especially where the population is in scattered villages and where there are natural geographic barriers. Like television, the large scale use of radio to teach at a distance was popularized by the Open University of United Kingdom. But even in that country only about 50 per cent of students listened to any one program and at the present time only a minority of courses make use of the radio. This decline in use has been offset by an increase in the use of audiotapes. Like TV, access to transmission times suitable to students is difficult in many countries.

In distance education, effective delivery of information to provide universal access to instructional materials for all students is essential. Television broadcasting has clear-cut distributional advantages over other forms of television (videocassettes, video disks, etc.). In the more technologically developed countries of the region, almost every household has a television set so that for the student the effective distribution cost is free. In countries where no such widespread availability of hardware exists, the use of broadcast television is likely to be extremely problematic.

For the institution using broadcasting, while transmission costs may be low, production costs are likely to be high, since specialized professional skills and the associated infrastructure must be highly sophisticated. The need for expensive equipment must also be taken into consideration. Further, since in most countries television is managed and operated by separate broadcasting organizations, access to transmission times suitable for students is difficult.

While it seems clear that learning from broadcast television is a difficult process, it can provide learners with useful resource material, including coverage of complex industrial equipment, expensive and dangerous experiments, drama, historical archive film, diverse geographical locations and interviews with famous personalities and experts. Overall, it appears that broadcast television needs to be used very selectively to provide students with experiences that may otherwise be inaccessible. Its specific value, like that of other media, will vary according to the context in which it is used.

The use of audiotapes is becoming more popular. Many students prefer it because the human voice can convey human feelings better than the printed word. Certainly a degree of technical and instructional expertise is necessary and certain equipment is needed for production. However, the tapes themselves are not expensive and can be reused, and replay equipment is becoming less expensive and almost as common as transistor radios. Audiotapes have the advantage over radio broadcasts in that they do not have fixed time requirements and the student can replay the tape as often as is required. There is evidence that an increasing number of students are taping radio broadcasts so that they can listen to parts of them a number of times.

As with videotapes, there is only limited advantage in merely taping face-to-face lectures and supplying these to students. Audiotape lessons need to be specifically planned and developed for external students. They are more useful when they form part of an integrated teaching package.

Videocassettes, although sharing some of the basic features of broadcast television (sound and moving pictures), are not restricted by pre-determined transmission times and a lack of learner control over the medium. Videocassettes enable the students to view the material at a time of their own choosing, with as many pauses and as many replays as necessary. Such increased learner control of the technology needs to be balanced against the potential problems of the lack of universal accessibility to hardware. Distribution may be complicated by the variety of formats and systems which are essentially incompatible. Further, compared to the cheap transmission of broadcast television, videocassettes demand a relatively expensive infrastructure for packing and delivery to distance education students.

There are other media which are increasingly coming into use such as telephone teaching, experimental kits, satellites, etc. The choice of media is a complex one, and there exists no quick and easy all-embracing principle. Even the search for a classification table which matches media with various combinations of subject matter, learner characteristics and course objectives may be counter-productive, in the sense that it may tend to oversimplify a complex issue. Rational decisions on which media use and on the different ways in which each medium should be used in order to achieve an optimal media mix are extremely difficult to make on strictly pedagogical grounds. Most instructional media are multifunctional and may be widely adapted to a variety of objectives, learners and subject matters, under the right circumstances.

D. Distance Teaching Perspective

From a teaching perspective, it must be acknowledged that the inherent nature of distance education includes features which are quite distinct from teaching that takes place in conventional educational settings. Distance teachings entails at least three elements which are not shared with much of the conventional approach to teaching. First, distance teaching embodies a permanent record of instruction which is usually captured in print, on audiotape or some other form of electronic media. Second, distance teaching tends to embody self-instructional principles and is largely learner oriented rather than teacher centered. Third, distance teaching tends to engender the use of a wider range of expertise for effective instructional courseware production.

These inherent aspects of distance education promote a multidisciplinary team approach to distance teaching rather than the singular activity which teaching tends to be in conventional settings. It demands a range of expertise including that of a subject matter specialist, an instructional designer, various media personnel and possibly computing personnel. It is assumed that the quality of the teaching material will be enhanced by the application of a wider range of expertise to the teaching/learning process.

Associated with this multidisciplinary team approach is a demand for systematic, pre-planning of teaching/learning experience. One cannot allocate expensive resources to the production of printed materials, audiotapes, videotapes or the like in a haphazard fashion, rather one must ensure a high quality product. Systematic pre-planning which engenders the design and development of high quality learning resources is again somewhat removed from the typical on-campus approach to teaching. A large proportion of the on-campus teacher's time is taken up in front of students, either in lectures, tutorials or laboratory settings. Distance education demands a switch in the orientation of the distance education teacher.

E. Distance Learning Perspective

Distance education has certain features which differentiate it from learning in conventional education systems. It must be acknowledged, however, that there is no necessary connection between instruction and learning. Learning is what the student does, and it may be unrelated to what the teacher does. Some students are likely to be successful learners, irrespective of the quality of teaching, others may be highly dependent on the quality of teaching, still others may be highly dependent on the quality and style of instruction. The possibly higher quality of the self-instructional package produced by a multidisciplinary team of experts for use in distance education seems likely to enhance the learning experience of distance education students.

At a more specific level, one might ask the question: What are the particular features of self-instructional packages that seem likely to enhance student learning? The delivery of such instruction (apart from systems dependent on broadcast media) is not tied to a particular time and place, as is the case with conventional education. Students can use printed study guides, audiocassettes, videocassettes and the like wherever and whenever it is convenient to them. Such learning resources are ces are infinitely adaptable to the pace at which individual students learn, since the pace of learning is not determined by set lectures or tutorial periods in group settings. As well as providing the flexibility of self-pacing, such materials also engender self-reliance among students who can increasingly take responsibility for their own learning. The well-structured distance education package facilitates a productive use of learning time.

In distance education systems, it is not unusual to find a degree of compulsory attendance at face-to-face meetings at a set time and a set place. The key remains in the detailed pre-planning and permanent nature of well-designed self-instructional packages produced for distance education which seem to have many inherent advantages over the transient nature of conventional lectures. The quality of on-campus education can be enhanced through the judicious use of distance materials. Shared material could also enhance the cost-effectiveness of both distance and conventional systems.

STATUS OF DISTANCE EDUCATION IN SELECTED COUNTRIES[3]

Distance education in Asia and the Pacific is coming of age in these days of microchips and communication satellites. But while new technology is bringing glamour to this field, correspondence courses still form the backbone of distance teaching method. The reasons for developing distance education – different in every country – are very closely linked with population and geography. On the one hand are the heavily populated countries of South Asia where the large number of learners place a tremendous pressure on the formal education system. At the other extreme for example is New Zealand, where population is thinly scattered and accelerated urbanization since World War II has meant that some rural schools have been closed for lack of pupils. The following pages give an overview of regional experiences in distance education.

A. Afghanistan

The Democratic Republic of Afghanistan has an unusually high rate of illiteracy and only a minority of children are in schools. The Government is urgently looking for ways to improve the education picture. The structure of the school program is changing, as are the textbooks. New methods and materials are being introduced to teachers through seminars and in-service courses. The Government is also studying ways to use distance education to reduce illiteracy and is keen to learn from the experiences of other countries in the region.

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[3] "Distance Education in Asia and the Pacific," *Bulletin of the UNESCO Regional Office for Education in Asia and the Pacific*, Bangkok, UNESCO, 1985.

Already a general system of distance education is being implemented through radio and television. General education programs aimed at children, adolescents, adults and illiterates are on the air. Not only teachers and children are being helped by these programs, but parents, too, are learning new attitudes towards their children's education and upbringing. No evaluation of these programs has yet been carried out.

The newest distance education program in Afghanistan is the distance teaching program for teacher educators at the Master's Degree level. This was due to begin in August 1984.

B. Australia

Primary and secondary: Australia's large area and small, unevenly dispersed population make distance education almost indispensable. Western Australia, for example, is approximately the same size as the whole of Western Europe, but has a population of less than 1.2 million. The majority of Western Australian children who live beyond the range of school bus services study at home until they finish year 7. Even after this many undertake secondary studies at home. The Western Australian Correspondence School provides courses from years 1 to 10 for students who do not have access to schools. Annual enrollments in the Correspondence School have levelled off at between 400 and 600 primary students and approximately 100 secondary students.

Lessons are divided into 20 sets of work, which students must complete and forward for marking every two weeks. The textbooks, mainly written by the staff of the Education Department Curriculum Branch, are issued free to students. In addition to written materials, students now work with audiocassettes, slides, filmstrips and video equipment, enabling the development of a greater range of skills.

"School of the air" – small units located in regional towns – supplement correspondence courses for more than half of the primary students. The main function of these two-way radio schools is to provide extra material in each of the subject areas, as well as experience in areas not covered by the regular courses. Only primary students may enroll with these schools. Groups of five to ten pupils from each year have a half-hour lesson each day, during which time they may listen and talk to their teacher and to each other. This enables more rapid feedback than the mail system and children gain a group identity. In addition, parents' queries, oral reports and examinations may be presented. There is also an itinerant teacher who visits isolated families to provide on-the-spot assistance.

In Western Australia, the Isolated Students Matriculation Scheme (ISMS) gives tutorial and material support to isolated students taking Years 11 and 12. Courses in English, History, Human Biology, Biology, Mathematics, Technical Drawing and Art have been prepared, while the development of other courses is continuing. All are recognized Tertiary Admission Examination subjects and follow syllabuses comparable to those of the regular schools.

Tertiary: Distance education at the tertiary level in Australia is organized on a regional basis. There are some five universities and ten colleges of advanced education involved. Enrollments by external students in these institutions vary from about 600 to 1,000 students. The distance institutions are involved in on-campus or face-to-face teaching as well. Most institutions use printed materials as their main distance teaching technique.

The Darling Downs Institute of Advanced Education in Queensland is an Australian model of distance education at the tertiary level. In this model internal and external teaching are fully integrated. Darling Downs started as an institute of technology in 1967 and still is vocationally oriented. The majority of its students are recent secondary-school leavers, although Darling Downs also has some adult students. In 1983 the Institute had approximately 4,500 students, over half of whom were external. Many of the external students are already employed.

There are five schools in the Institute: Applied Science, Arts, Business Studies, Education and Engineering. A Department of External and Continuing Education handles all aspects of external teaching by working closely with the five schools. The Department, in turn, is divided into five sections: Instructional Design, Outreach, Continuing Education, Research and Evaluation and Production.

The Outreach Section provides support to external students through a network of regional liaison officers. There is also a telephone service, through which students are able to leave messages at night, early in the morning, or during the weekend. These are recorded, and responses are sent back as quickly as possible. Telephone tutorials may be pre-planned or on request. Regional Study Centers in some cases contain loudspeaker telephones which allow lecturers at the Institute to conduct tutorials simultaneously in up to five centers. This service not only enables students to generate discussion and to exchange ideas among themselves, but also facilitates immediate feedback from their lecturers, as in a classroom situation. Some of the Study Centers now have computer-managed learning programs in addition to the telephone tutorials.

The Regional Liaison Officers are available to counsel students regarding administrative as well as academic problems. In addition to the Study Centers, there are also residential schools which provide instruction that cannot be readily provided at a distance, such as in laboratory experiments.

Teacher education: Pre-service teacher training is offered at a distance by a number of Universities and Colleges of Advanced Education. Distance education for in-service teachers takes the form of degree courses in education, post-graduate diplomas in various aspects of educational studies and post-graduate degree courses. Instruction is done largely through print materials. Teachers working in the technical and further education sector are often trained during their first one or two years of employment as teachers. Such training is offered at a distance by some Colleges of Advanced Education.

C. Bangladesh

While school broadcasting programs have been in existence for many years, another important distance teaching activity started in 1978 in Bangladesh when the Japanese Government gave assistance to further develop the school broadcasting system. The aim of the project was to improve the quality of teaching at secondary school level. The Japanese Government supplied 1,100 audiocontrol console sets consisting of radio receivers, amplifiers, cassette recorders, public address systems and speaker facilities for classrooms, along with ten mobile audiovisual vans.

During the implementation of the school broadcasting project, the Government became more aware of the potential of different media for distance teaching. At this point it was decided to merge the Audiovisual Education Centre and the school broadcasting program to form the National Institute of Educational Media and Technology. Subsequently, the Bangladesh Institute of Distance Education (BIDE) has been established as an important step towards widening access to and improving education in Bangladesh. BIDE in cooperation with the Rajshahi University started the first B.Ed. program for about 3,000 in-service untrained secondary school teachers through distance teaching in 1985.

D. China

Primary and secondary: China's educational system is divided in two: conventional education and adult education. At present distance education is little used in conventional primary and secondary education. As part of the drive for China's modernization, however, conventional schools are being encouraged to set up audiovisual education centers. With guidance from the Ministry of Education, the National Agricultural Broadcasting School may soon be able to offer specialized courses at secondary level for China's vast rural population.

Tertiary: Distance education is done in two ways: through courses offered by correspondence departments of conventional universities or independent correspondence colleges; and through multimedia courses (radio, television, correspondence, audiovisual cassettes, slides and films) offered by the Central Broadcasting and Television University (CRTVU). This is under the joint sponsorship of the Education Ministry and the Ministry of Radio and Television. Its courses are available all over the country. At the same time, conventional universities are being encouraged to set up more correspondence schools.

Distance education at the tertiary level and for adults is more developed. Beginning in the early 1960s, it has grown rapidly to fill the urgent need of the national economy for trained personnel. At present in addition to the 700,000 registered students, CRTVU also has approximately 300,000 spare-time viewers bringing the total number of students to more than 1 million. The decentralized distance education system handles this massive number of students through the CRTVU, 28 provincial television universities, 370 branch schools under the provincial universities leadership and 20,000 grassroot classes in enterprises, institutions and units through the community. These form the core of China's distance education.

Training distance education personnel: In the past few years, distance education institutions have organized various training activities to teach tape-recording, video-recording, film projecting, equipment maintenance and program editing. The CRTVU also convenes several national conferences every year to discuss teaching objectives, teaching plans, techniques of student registration, examination rules and graduation requirements. Television university teachers are trained at two levels: national and provincial. The CRTVU does national teacher training. The Central Audiovisual Centre has held many workshops, which are held both at the national and regional level. All the abovementioned training activities have played an important role in promoting distance education in China.

E. India

Primary and secondary: India made an early start in the use of radio in the schools. In the early 1950s, radio was already being used to supplement the regular curriculum. In this polyglot nation, language broadcasts have been given special emphasis. The use of television started in 1962 in New Delhi. Telecasts are used to support classroom teaching in selected subjects.

In 1975–1976, India launched the Satellite Instructional Television Experiment (SITE). Of the two and one-half hours set aside for education every day, the morning telecasts were used for primary education. The lessons were both self-contained and in series. They were motivational and not strictly syllabus oriented. Only one set of programs was broadcast for all viewers in the 6–11 age range.

At the secondary level distance education started formally in 1965. The Boards of Secondary Education, however, have had a long tradition of allowing private candidates to sit their examinations. At present there are at least four Boards of Secondary Education offering correspondence courses. Printed materials remain the main form of instruction in these courses.

Tertiary: Distance education at the tertiary level started with the introduction of correspondence courses at Delhi University in 1962. The courses were largely a response to the increasing number of students seeking admission to universities and colleges. Other universities quickly followed suit, and today about 30 universities offer correspondence courses both at graduate and postgraduate levels. Distance teaching is still done primarily through printed material, although some institutions, such as the Institute of Correspondence in Patiala and Chandigarh, do use radio broadcasts and other media. There are also personal contact programs to supplement correspondence education.

Open university: The first open university in India was officially established by the state Government of Andhra Pradesh in 1982. For the first year of instruction, 1983–84, the University offered courses leading to the B.A., B.Com. and B.Sc. degrees. No formal educational qualifications are prescribed – anyone can enroll for an undergraduate course after passing the Entrance Test administered by the University. The only exception is made in the case of B.Sc. course, for which some science background is required.

Courses are planned by expert committees consisting of a subject editor, a few course writers, a language editor and a coordinator. The coordinator is a full-time employee of the University whereas the course writers are usually outside experts.

In addition to printed material, lessons are planned for radio and video. All India Radio provides broadcast time for lessons. Altogether 28 Study Centers have been established in the State. These are located in existing colleges and are open on certain evenings, as well as on Sundays. As a heavy emphasis is being placed on video lessons, video equipment is available at the centers, along with audiocassettes.

In 1985, an open university at the national level, Indira Gandhi National Open University came into existence. The University is set to offer academic programs. It plans to introduce courses for the training of distance education personnel themselves.

Non-formal education: India has launched a massive non-formal education scheme to help students whose income-generating activities interfere with their education. At the primary level, a project named Comprehensive Access to Primary Education (CAPE) has been developed, which seeks to non-formalize teaching in terms of content and methodology. An Open School has also been started for learners at the secondary level. Various distance learning techniques are being experimented with in both of these programs.

Both radio and television have been tested for the instruction of adult learners. The SITE project made available evening programs for adult education and community development. Rural radio forums to teach agriculture, health, literacy, education and other aspects of social development were established on a pilot basis in the 1950s, but have not been widely expanded.

Teacher education: Four regional colleges of education have been conducting summer school-cum-correspondence courses for in-service teachers since 1966. Working secondary and primary school teachers who have not received teacher training are able to earn their Bachelor of Education degree through a combination of correspondence instruction, two-month summer sessions of intensive instruction on-campus, and practice teaching.

F. Indonesia

As a result of Indonesia's geography, transportation and communication problems, distance education offers ways to overcome schooling problems that cannot be solved using traditional approaches.

Primary: Pamong (Pendidikan Anak Oleh Masyarakat, Orangtua dan Guru, or Instructional Management by Parents, Community and Teachers) schools have been developed in Indonesia to provide primary education in an informal way for those who cannot go to ordinary schools regularly. The delivery systems are therefore created mainly for primary school dropouts, or school-age children in sparsely populated areas where there are insufficient schools and teachers. Pamong self-instructional materials were used at the national level beginning in 1984. The use of printed self-instructional materials in the Pamong system makes the learning process flexible in terms of time and place of learning.

Secondary: The Open Junior High School provides instruction through programmed printed materials, audiocassettes, slides and radio. Each Open Junior High is attached to a regular junior high school, which becomes the base school.

The curriculum of the Open Junior High is the same as the curriculum of the regular junior high school. The students study in places called Centres of Learning Activities, where they are supervised by a tutor. Each tutor has approximately 5 to 20 students. He does not teach in the classroom, but facilitates learning events by organizing learning groups, motivating the students, preparing modules, radio receivers, cassette players and slide projectors as needed. Once a week the students come to the base school for face-to-face instruction with teachers at the regular school.

Open university: As the current university system is no longer able to meet the increasing demand for higher education, an open university has been established (1984). At present, some 150,000 students have been accommodated by the new system. Courses of study include a program to upgrade university teachers and a diploma program for secondary school teachers. The third program will be for post graduate studies in Public Administration; Business Administration; Economics and Development Studies; and Applied Statistics. Eventually, the University will have five faculties: Teacher Training and Educational Sciences, Social and Political Sciences, Economics, Mathematics and Science and Agriculture.

The teaching methods adopted by the Open University allow students to increase their capability for self-study as well as group study. In line with the credit system, a student is required to take a number of module packages. Tutors and assistants are provided to assist students individually or in groups.

Instruction is managed and administered by regional offices affiliated with local universities. These offices register students, distribute learning materials, administer tests, train counsellors and assistants, and provide assistance to the sub-branches – the nearest resource center to the students. Methods of teaching include the use of printed materials, face-to-face interaction with tutors (directly or indirectly via the satellite communications system), radio and television programs, and laboratory and field work.

Teacher education: To overcome Indonesia's shortage of teachers, the Government has had to start a crash program to recruit teachers without qualifications. In-service training for teachers is therefore a must. The principal medium used for in-service education is radio. Radio is inexpensive, educationally effective and it has already become an accepted part of the nation's culture. Printed materials are, of course, used to supplement the radio instruction. The Educational Radio Broadcasting System is run by the Centre of Technology and Communication of Education and Culture. This Centre is responsible for planning, facilitation and distributing programs.

G. Malaysia

Primary and secondary: Distance education has existed for some time in Malaysia, in the form of correspondence courses run by private enterprises and by Government though distance teaching is not deemed necessary at the primary and secondary levels. Around 98 per cent of the population enter primary schools, and the dropout rate is fairly low at 10 per cent. In these circumstances, educational television and radio become supportive services to formal teaching.

Distance education is basically the preserve of the Educational Media Service Division (EMS) in the Ministry of Education. When it was established in 1972, the Division incorporated an educational radio section and an audiovisual aids section with a newly formed educational television section.

The EMS is responsible for the preparation, production and dissemination of teaching materials and programs. The educational radio and TV programs are meant to complement and supplement the teachers' work in the classroom. The TV programs are telecast by Radio-Television Malaysia with repeat telecasts on Mondays to Thursdays. Educational radio programs are broadcast in three languages using three networks. There are 77 series of programs broadcast each week with repeats in the afternoon.

Tertiary: Government-sponsored distance education at the university level is at present limited to the off-campus academic program of the University of Science in Penang. The program was started in 1971 in the School of Humanities and the School of Comparative Social Sciences. The School of Physics and Mathematics joined the program in 1973, followed by the School of Chemical Sciences and School of Biological

Sciences in 1974. The Language Unit also offers courses in Bahasa Malaysia and Linguistics.

The courses that are offered are of the same standard as those for full-time students, although the teaching methods are different. Currently, there are 140 courses offered, taught by 151 lecturers. On completing the program successfully, students receive the Bachelor of Arts, Bachelor of Social Sciences or the Bachelor of Science degree.

From an initial intake of 100 students, the off-campus program has grown to about 900 students which is 20 per cent of the total enrollment of the University. The success rate of off-campus students is high as admission requirements are the same as for on-campus students.

Off-campus instruction is done mainly through printed materials. For certain courses, audiocassettes are provided. Slides are also available at regional learning centers. Only courses in humanities and social sciences use radio – broadcasts are limited to 30 minutes weekly.

Non-formal education: The Ministry of Information in Malaysia produces TV and radio programs of general interest on topics such as agriculture, housecraft and Islamic knowledge.

H. Maldives

There is not yet an established system of distance learning in the Maldives, but some distance learning activities do exist for formal as well as non-formal education. And given the fact that the population of about 172,000 is scattered among 200 islands, there exists potential to put distance education on a firmer footing in the future. At the moment, a series of radio programs on the teaching of English for Grades I and II is broadcast every school day. These programs are intended for pupils on remote islands who do not have access to proper instruction. 'Radio Haveer', a daily program, instructs the general public on fisheries, agriculture, health, history and tradition. Programs are also broadcast on environmental studies and to upgrade in-service teachers.

If a distance learning system can be established using two-way radio, the Atoll Education Centres will play a major role in its operation. These centers are headed by headmasters who serve both as principals and as the key educators. Therefore, they will need training in radio conference in the future. The supporting staff of scriptwriters, broadcasters and technicians will also need relevant training.

I. Nepal

Nepal, a mountainous country where one-third of the districts are officially declared remote areas, is an obvious place for the development of distance education. Moreover, a boom in school enrollments since the 1950s means that the number of teachers has had to be rapidly increased.

The Government of Nepal, recognizing the potential of teacher training by radio, began working with USAID in 1972 to develop a plan. In 1978, then, a project known as Radio Education Teacher Training Programme (RETTP) was launched with technical assistance from Southern Illinois University in the United States. The main objective of the RETTP was to develop and test a training program for untrained, rural primary school teachers, which would use the medium of radio reinforced by written self-instruction materials and periodic workshops. The program had to meet basic certificate standards.

A supply of over 25,000 radios was made available – each teacher enrolled is loaned a nine-volt radio set along with a supply of batteries for the year of training.

The curriculum stresses the skills and attitudes required to teach pupils in the first three primary grades. In addition, it covers topics which enable the rural teacher to function more effectively as an innovator and agent of change in her community.

The entire course requires about two hours of work per day, five days a week for approximately ten months. Over 1,000 teachers were enrolled for the first full-year program in 1981–1982. The current plan is to repeat the program each year until approximately 6,000 untrained primary school teachers have been trained. Future programs will be developed for lower secondary teachers.

J. New Zealand

Distance education is well established in New Zealand and is fully integrated with the formal system.

Primary and secondary: For school children at all levels, the New Zealand Correspondence School (NZCS) has provided education since 1922. Originally, the School catered only to children in remote areas or those who were unable to attend school because of a physical handicap. At present, a large portion of the 9,000 school-age students enrolled are in ordinary schools, but taking special subjects from NZCS for which their schools lack teachers. Approximately 11,000 adults who are resuming studies after leaving school early are also enrolled.

Tertiary: University distance education is provided by Massey University's Centre for University Extramural Studies (CUES). Massey, with around 5,000 internal students, has a wide range of degrees and diplomas, some but not all of which are offered extramurally. The main method of distance instruction is correspondence, including audiocassettes, but each course requires a short on-campus or off-campus contact period when students meet academic staff. Radio and television are not used, mainly because many courses have too few students to warrant airtime. Regional support, especially in education courses, is provided by off-campus tutors who are members of the Faculty of Education. Other regional tutors are rare, but the Students' Association does provide advice and feedback and organizes study groups.

Non-formal education: Alongside the distance education institutions of the formal system are several non-formal programs. The Continuing Education Unit of Radio New Zealand broadcasts programs in short series on matters of public interest; the Workers Educational Association – Trade Union Postal Education Service provides courses in basic educational skills for early school leavers, as well as courses on labor education. The Extension Department of Otago University operates a provincial outreach program of studies using telephone tutorials.

Technical education: New Zealand's largest distance education institution is the Technical Correspondence Institute (NZTCI), with a current enrollment of around 35,000. In addition to New Zealand students, it is open to overseas students in countries where the New Zealand Foreign Aid Programme applies. Approximately one-quarter of the students are studying at craft level (mainly apprentices) for technician courses, one-quarter are studying for professional qualifications and the remainder for various qualifications at sub-professional level. Nearly all courses are aimed at national qualifications issued by such bodies as the Authority for Advanced Vocational Awards, the Institution of Engineers, the Society of Accountants, the Law Society and others.

Printed material is the main method of instruction. Textbooks are required only for supplementary reading. The whole system is based on individual instruction at the pace of each student.

Printed assignments are supplemented by other media. Students of many courses are required to complete laboratory courses or block courses in practical work each year. Most of this is handled by directing the student to a practical course at one of the regional class-contact institutes, or in the case of technician or professional students, at the Central Institute of Technology.

All students who are currently employed are, of course, doing practical work daily in their employment. Some of them are required to complete assignment projects at their workplace (e.g. jewelry apprentices), while in other cases large firms themselves supplement correspondence teaching.

Little use has been made of radio or TV support programs as the number of students involved in each specialist subject is relatively small. Videocassette instructional tapes have been produced in the Institute and increased use of such tapes is planned.

K. Pakistan

Pakistan like many other countries has acute problems in delivering education to its growing population. The inability of the formal system to provide the necessary skills to the masses of people is now being acknowledged by the policymakers and planners. This situation has, therefore, prompted serious experimentation with other approaches. Distance education through correspondence, radio, TV, tutorial sessions and other techniques, has been considered as a possible alternative.

Open university: Pakistan's first substantial effort in distance education has been at the tertiary level. This culminated in the founding of Allama Iqbal Open University (AIOU) fourteen years ago. The decision to start an open university was prompted by the need for a cost-effective way to provide education to large numbers of adults. The AIOU multimedia system is designed to reduce social inequalities in education, to make education available to those who have not been able to take advantage of formal institutions, and to help adults integrate their occupational and educational activities.

In addition to the print materials, which constitute the core medium, the University, on average, produces, develops and records about 300 radio programs and 75 television programs each semester. These are prepared by course coordinators in collaboration with technical staff. The Pakistan Broadcasting Corporation and the Pakistan Television Corporation offer their services to the University at subsidized rates.

Teacher education: AIOU offers a wide range of courses in education. The Primary Teachers' Orientation Course is the largest program. By 1981 about 65,000 primary teachers had been oriented this way. The Primary Teachers' Certificate is designed for the training of in-service matriculate teachers, while the Certificate of Teaching is a new course offered for middle-level, untrained teachers.

The University currently offers a wide range of courses at the Degree and Non-Degree Levels. The M.A. in Educational Planning and Management is the most advanced program offered by the University.

AIOU has not yet developed a comprehensive training program for personnel in distance education. The University does, however, follow certain techniques to orient these people to their work.

L. Papua New Guinea

Secondary: The College of External Studies (COES) has been providing secondary level education on a correspondence basis since 1956 in Papua New Guinea. Originally it was conceived as a means by which working public servants could upgrade their qualifications. Until 1964 the College used courses prepared in Queensland, Australia.

In 1981, the Committee of Standards stated that the purpose of the COES is to provide a continuing system of education, alternative to that of the formal school system, for those who, for one reason or another, have been unable to pursue the latter. The College provides an education for those people who are unable to continue their studies through the formal system. To provide a means whereby without leaving the workforce, men and women can study and upgrade their qualifications.

At present, the College offers courses to more than 9,000 students. These cover Grades VII to X in the following subjects: English, Mathematics, Social Science, Commerce, Science, Environmental Studies, and neighboring countries. As in the formal school system, the final statement of achievement is the School Certificate.

The use of media other than print is as yet little developed, but a weekly program in English is broadcast. Audiocassettes are coming into use, and it is hoped that more work can be done on this program.

M. Philippines

The Philippines uses distance learning in a limited way to deliver education to out-of-school youth and adults. Among the steps taken to encourage distance learners are the relaxation of entry requirements, attendance or residence conditions for courses, and the adoption of a flexible approach towards pace of study and examination procedures.

Secondary: The main objective at the secondary level is to help elementary school graduates who have had no opportunity to enter high school, to return to the mainstream of formal education. This program is called the Distance Learning Delivery System and was launched in 1983. It began with 13 pilot centers in the 13 educational regions of the country. The initial stage consisted of the production of materials, training of tutors and conferences on implementation. Nine modules have been written, tested and finally produced in large quantities. The system will be implemented on a small scale at first, while additional staff are being trained.

Non-formal education: Distance education is used in the non-formal sector by the Philippines' University of Life. The University conducts programs for adults and out-of-school youth on food production, energy conservation and entrepreneurship. Instruction is carried out through modules developed by subject experts.

Another project which falls under non-formal education is the 'Self-Learning Integrated Modules for Mothers' (SLIMM). The SLIMM project was developed to help mothers realize the potential of their pre-schoolers and to prepare them for Grade I. So far, field testing of SLIMM among a sample of mothers from four villages shows that those who use the modules are as effective in teaching their pre-schoolers as mothers who are trained teachers.

Teacher education: The teacher education aspect of distance learning is being implemented by the Baguio Vacation National School, an in-service training institution run by the Ministry of Education, Culture and Sports. The program, called Continuing Education of Teachers (CET) has been developed by the Educational Communications Office of the Educational Projects Implementation Task Force.

On the southern island of Mindanao, there is another program for teacher education known as the University of Mindanao on the Air (UM Air). The University graduate school launched this program to enable teachers in remote areas to obtain a Master's Degree at minimum expense; UM Air utilizes the radio stations owned and operated by the University broadcasting network.

N. Republic of Korea

Three important distance education systems exist in Korea: radio broadcasting for elementary schools, radio and correspondence courses at the high school level, and a tertiary level air and correspondence university.

Primary: In 1972, a plan for educational broadcasting was developed as part of a reform in the elementary and middle schools. The Government established a broadcasting system that included radio and television, within the Korean Educational Development Institute. Radio broadcasts for elementary schools began in 1974.

The radio programs are produced for all six grades of primary school. Programs range from 15 to 30 minutes in length and are broadcast over a period of three hours each day. Approximately 3,000 programs are produced annually. The Korean Education Development

Institute produces radio programs, program guides and teachers' guides. The program guides and teachers' guides are sent to all elementary schools located within the signal receiving zone.

Radio broadcasting is used more in rural areas than in cities and towns. Some remote areas are, in fact, heavily dependent on broadcasts. The way the programs are used varies from school to school. Some use taped programs; others use them as they are broadcast, while others use their amplifier system so that an entire grade may listen to a program at the same time.

Secondary: An Air and Correspondence High School (ACHS) was founded in 1974 to serve the youth population who, for economic reasons, cannot attend formal school. Now a system of 48 high schools, the ACHS has 35,000 students enrolled. About 75 per cent of ACHS students work, and their economic status is low. Instruction is largely through self-learning and radio. The students receive textbooks, a guidebook for radio instruction and monthly self-learning modules.

Each Air and Correspondence High School is annexed to a regular high school to make use of existing facilities and personnel at low cost. The students attend their nearby school every other Sunday; regular high school teachers provide instruction for extra pay.

Tertiary: The Korean Air and Correspondence University (KCU) was founded in 1972 as a two-year junior college. KCU's founders would prefer to define it as an educational institution for adults who are deprived by financial and other reasons of the opportunity to receive high education. As part of a system of lifelong education, the KCU is designed, in fact, to improve national educational standards and to produce trained manpower for the development of the country.

As of March 1983, KCU had ten departments offering five-year university courses and one junior college course. During the same period, 33,800 students successfully completed the prescribed course of study, or 29.9 per cent of the total admitted.

One major problem the KCU now faces is the sudden and rapid increase in admission quotas. This threatens the quality of education and has swamped the 50–member faculty with papers to mark. Use of computers alone will not be enough to evaluate each student's achievements. Supporting colleges in the provinces which take KCU students during summer and winter vacations are also finding the charge beyond their capabilities.

One possible solution may be to establish separate facilities of correspondence education in cooperating colleges and universities, and to give them the task of teaching and supervising the students. The KCU could then concentrate on the production and distribution of teaching materials, production and transmission of radio and TV programs, and production of other educational aids.

O. Sri Lanka

Primary and secondary: Sri Lanka's system of universal free education, compulsory up to Grade X, means that there has been little need to use distance education at the school level. Some private organizations have offered correspondence courses to school leavers preparing for public examinations, but this has been without any Government sanction or evaluation. In addition to the correspondence courses offered by the private sector, there is a program of distance teaching directed primarily at the senior secondary level. This uses television to teach certain specialized subjects such as mathematics and science.

Open university: Sri Lanka's system of universal education yearly produces students with more and more schooling, as well as enhanced career expectations. But only 2 per cent of this number can enter university — the others must seek alternative vocational and technical training. It was to fill this need that the Open University was started in 1980. Initially, it concentrated on Diploma and Certificate courses in Mathematics, Science Management Studies, Electronics and Telecommunication Technology and other specialities. There are now around 18,000 students enrolled. A number of new courses, in Food Science and Technology, Entrepreneurship and Languages, for example, are being formulated. Foundation courses are provided for students who do not have adequate knowledge to pursue tertiary level courses.

Instruction is via printed material and weekend and vacation contact sessions which use radio and television. Course duration varies from six months to three years. Lessons are oriented on the lines of the Open University in the United Kingdom.

Teacher education: The newest use of distance education in Sri Lanka is in teacher education. There has been heavy recruitment of new teachers with only O and A Level qualifications in recent years; thus, of the 140,000 working teachers in the school system, around 35,000 have no professional training.

The main objective of the distance program is to provide training to the backlog of untrained teachers as quickly as possible. The program is executed by the Distance Education Branch of the Ministry of Education. The program is being organized on a district basis, with a senior tutor and a number of field tutors appointed to each district. Teachers centers have been set up for support purposes in each district. By the end of 1985, 300 such centers should be set up. Their functions will be to: reinforce the self-learning activities of distance learners; adopt measures and develop programs to foster in the teachers a sense of commitment to work; and enable teachers to experiment with techniques and skills in handling groups and to share professional expertise.

Study material covering an entire course in modular form is provided to the student teachers. Feedback is obtained through assignments submitted by the students. Study circles and contact sessions are organized at regular intervals. The delivery of modules to the student depends on his or her pace of progress; the distance education branch maintains progress charts for students. As supplements to the modules students are supplied with audio and videocassettes.

P. Thailand

Primary and secondary: Thailand has concentrated on developing educational radio as a supplement to school instruction, mainly at the primary level. Since 1958, the Ministry of Education has had radio programs for schools, but until recently these broadcasts reached only a limited portion of the country. Although educational television was experimented with in the 1960s, most of the programs that were developed have not survived. With World Bank advice and funding from the International Development Agency, in 1978–1979 the decision was made to develop a National Educational Radio Network (NERN) under the control of the Public Relations Department.

As part of this project, a Centre for Educational Technology (CET) was completed in 1982, whose main function is to produce radio programs for schools. The CET gets 25–½ hours per week for its broadcasts on the NERN, or 19.51 per cent of total network time.

At the primary level, broadcasts cover the whole range of subjects, while for secondary students broadcasts are limited to English language and educational guidance. Training materials for teachers using the radio broadcasts are sent to District Education Supervisors and to school clusters. In theory, the clusters hold a meeting every month to discuss these materials, but there has been no survey to find out how many actually do so.

As the CET has been in operation only three years, there are still management problems to be sorted out involving procurement and storekeeping. With a target audience of eight million to serve, the CET has not yet begun to evaluate the effectiveness of its broadcasts. Information on the programs available has still not filtered out to all the teachers who are potential users, although in general the reception has been positive.

Open university: Sukhothai Thammathirat, Thailand's open university, accepted its first students in 1980. Temporarily housed in five buildings scattered around Bangkok, the University headquarters opened in 1984. By the end of 1985, the University had an enrollment of about 400,000 students — covering every province in the country. Admission to the University is open, with no entrance examination.

The first three schools to offer courses were the School of Liberal Arts, the School of Educational Studies, and the School of Management Science. In 1982, the University increased its enrollment by admitting students in the Schools of Law, Health Science, Home Economics and Agricultural Studies and Cooperatives. By 1983, the University offered courses in the School of Political Science as well bringing the total number of schools to nine. Approximately 90 per cent of the students are working adults, the remainder are recent graduates of secondary schools.

Printed self-instructional course materials accompanied by audiocassettes constitute the principal medium of instruction. Television and radio are also used quite extensively.

Since the Open University provides home-based study and uses a variety of teaching media, the number of full-time staff required is smaller than that of other universities. The full-time staff now numbers 431, of whom 106 are permanent faculty.

In addition to its degree programs, the University has established two types of continuing education programs – a certificate of achievement program and joint programs with other agencies. In the certificate of achievement program, there are no limits on enrollment. Students study the same integrated courses and sit for the same examinations as do regular students. If they pass the examinations for a particular course, they receive a certificate of achievement. In the joint programs, the University cooperates with various governmental and private agencies in setting up programs of personnel development. Joint programs established so far include cooperative arrangements with the Police Department, the Department of Lands, the Ministry of Agriculture and Cooperatives, and the Bangkok Bank.

Non-formal education: Thailand's National Educational Radio Network reserves time for what could loosely be called non-formal educational broadcasts. These include 7 hours per week for farmers, 20 hours for non-formal students and 2 hours and 20 minutes for health programs aimed at the general public. A Radio Correspondence Programme (RCP) devoted mainly to adult education is produced on a regional basis. RCP broadcasts cover literacy, agriculture and special interests such as cooking.

Teacher education: Several projects have been launched to upgrade Thailand's untrained teachers. The Teachers Institute started a Correspondence Course for In-service Teachers in 1969.

The Teacher Training Department's Radio Correspondence Programme is also designed to upgrade the qualifications of teachers. It uses correspondence supplemented by radio. Cassettes are also available for course members who miss broadcasts. Study materials are mailed to the course members, who must in turn mail back assignments for evaluation. Radio transmissions via the NERN cover six subjects and are broadcast in 30-minute lessons all year round. By 1981, more than 50 per cent of students had passed the annual examinations.

Thus, one would see that the countries represent a wide range of experience and possibility in distance education. Some countries are yet to begin distance education in a serious way. The policymakers in these countries, though, are aware that it offers them opportunities for improvement of education. Some countries on the other hand can claim decades of distance education that is now undergoing renewal and revitalization. Between these are countries which have made a positive start. They have recruited worthwhile personnel, developed materials, set up physical facilities and now can consider new areas of activity, developing new courses and evolving new supporting structure.

UNESCO ROEAP's PROGRAMS AND ACTIVITIES

ROEAP's involvement in promoting distance education in this region has been quite substantial in recent years in response to the need for the attainment of literacy and universalization of primary education as well as the increasing demand for wider access to higher and continuing education. The emphasis of UNESCO's programs has been on the training of distance education personnel, development of training materials, documentation and promotion of regional cooperation. Keeping this in view, ROEAP in cooperation with the associated institutions and centers has organized a series of experts meetings, training workshops (regional, sub-regional and national), study visits, attachment and brought out a large number of publications.

ROEAP's activities have been carried out mainly within the framework of two regional programs namely (i) the Asia-Pacific Programme of Educational Innovation for Development, and (ii) the Regional Cooperative Programme in Higher Education for Development in Asia and the Pacific. Short account of some of these activities is presented in the following section.

Study Group Meeting on Universalizing Education, Bangkok, 26 September–7 October 1978: Motivated by common problems such as illiteracy, shortage of qualified teachers, and the need for effective teaching approaches, participants from ten countries met to discuss possibilities of adoption of new techniques to facilitate the universalization of education. The report of the meeting contains highlights of their experiences on the design and use of new educational techniques. This is followed by a synthesis of experiences in the preparation and upgrading of different categories of teachers and other educational personnel and guidelines on use of new educational techniques. Appended to the report are proposed elements for redesigning and development of distance teaching programs in two countries.

Technical Working Group Meeting on Educational Broadcasting, Kuala Lumpur, 19 November–10 December 1979: The objectives of the Kuala Lumpur meeting were to discuss problems and exchange experiences in educational broadcasting in the region, to identify training needs and to develop guidelines for the production of radio and TV programs. The report provides a summary of educational broadcasting in the participating countries, and outlines common problems and trends. Guidelines for the development of educational broadcasting services apply specifically to the universalization of education and the special needs of rural communities.

Sub-Regional Course on Educational Broadcasting, Kuala Lumpur, Malaysia, 3–16 October 1981: Organized in collaboration with the Asia-Pacific Institute for Broadcasting Development (AIBD), this course was a follow-up activity of the four national workshops on educational broadcasting held in India, Japan, Republic of Korea and Philippines. The main feature of the report on the course is the synthesis of the four national reports, and was aimed at helping program planners, administrators, policymakers and utilizing agencies with regard to: (i) policy decision on the role of broadcasting; (ii) procedure and mechanism of implementation; (iii) utilization; (iv) evaluation; (v) problem areas; and (vi) future projection.

Technical Working Group Meeting on Distance Learning for Teacher Education; Allama Iqbal Open University, Islamabad, Pakistan, 4–16 November 1981: The meeting was convened to review, examine and develop materials used in distance learning for teacher education. The meeting produced a three-volume report: Volume I – Current Status, Programs and Practices; Volume II – Guidelines on Development of Materials; Volume III – Exemplar Materials.

The first volume documents experiences in distance learning materials of the participating countries, national follow-up activities and suggestions on distance learning. The second volume contains two sets of guidelines. One set is on alternative structures and strategies in organizations, addressed to policymakers and senior administrators. The other set is on processes for developing materials, addressed to teachers and others responsible for providing learners with distance learning materials. The third volume consists of 11 exemplar materials on distance learning drawn from those of nine countries of the region and classified into correspondence course materials, self-learning materials, programmed texts, radio and television.

A Regional Seminar on Further Training of National Officials and Specialists in Distance Education, Islamabad, Pakistan, 8–18 August 1983: Participants from India, Indonesia, Republic of Korea, Malaysia, Nepal, Pakistan, Philippines and Sri Lanka analyzed country experiences on training of distance education personnel, reviewed major issues in identifying target groups, problems and issues in distance education programs and their implications for training distance education personnel, specified the learning needs of various categories of distance education personnel including training design, prepared draft plans for national pilot follow-up activities/programs by countries, and selected, improved and suggested for further development exemplar materials, methods and built-in evaluation for distance education courses. The seminar report also contains a simulated exercise concerning the use of media in solving educational problems, in which the participants took part. This is expected to be of immense help in training programs.

Sub-Regional Training Workshop on Distance Learning Systems and Structures – Training of National Officials and Specialists, Colombo, 5–18 July 1984: The country reports contained in the workshop proceedings showed a wide range of experience and possibility in the provision of distance education. Some countries have plans to offer distance education while other countries can claim many years of distance education that is now undergoing renewal and revitalization. All countries, however, indicate the need for training of their distance education personnel.

Inter-Country Study Visit-cum-Mobile Workshop, Thailand and Australia, 6–16 September 1983: A group of key personnel in distance education at the higher education level from Bangladesh, China, India, Indonesia, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand and Socialist Republic of Viet Nam studied various aspects of Sukhothai Thammathirat Open University (STOU) in Thailand and the Darling Downs Institute of Advanced Education (DDIAE) in Australia. The report of the study visit-cum-workshop contains an overview of challenges of distance education at a glance in some countries of Asia and the Pacific; report on two distance teaching systems (DDIAE and STOU) and aspects of planning, operating and evaluating a distance education system. The study visit was limited to higher education.

Regional Training Workshop on the Development of Distance Education Instructional Materials, STOU, Thailand, 9–19 September 1985: Attended by 22 participants from 12 countries of this region representing various systems and types of higher education institutions, brought together their experiences in working together in practical situation and developing materials that could be used as examples. The workshop report contains discussion on issues and principles of distance education, description of practical work and production by the participants as well as guidelines and recommendations concerning instructional materials development and related national training workshops.

Regional Training Workshop on the Development, Use and Evaluation of Broadcast Materials, Allama Iqbal Open University, Islamabad, Pakistan, 29 June–7 July 1986: The emphasis of this training activity was on radio and television broadcast materials for distance teaching purposes at the higher education level. Seventeen participants from nine countries joined the training course. The outcome of the workshop has been a package of (i) content materials for the training course, (ii) a workbook, and (iii) the workshop report. These documents give the details of training activities, status and prospects of use of radio and television and guidelines for the effective use of broadcast media.

National Training Workshops: As a follow-up of the above two regional training workshops, six national training workshops related to instructional materials development have been organized in seven different countries namely Bangladesh, India, Indonesia, Pakistan, Papua New Guinea, Sri Lanka and Socialist Republic of Viet Nam. More than 150 persons from distance teaching universities and institutes have participated.

The reports of the various workshops, expert meetings together with other publications for example, *Directory of Institutions of Higher Education in Asia and the Pacific* (1982); *Directory of Resource Materials in Distance Teaching by Higher Education Institutions* (1984); the bi-annual distance education newsletter *Never Too Far* and others published by ROEAP in close cooperation with the participating institutions constitute important sources of information on distance education. ROEAP plans to continue its support to distance education activities in the member states.

SOME PROBLEMS AND ISSUES

It is evident that in recent years many countries in Asia and the Pacific have extended the range of educational opportunities by adopting distance teaching methods. It is also to be expected that the range will continue to expand supported by new advances in communication technology. One must, however, also observe that recent developments have been confined mostly to higher education. A number of universities/institutes committed to distance teaching have been established since 1970 and indications are that there will be others to follow. Examples are: Allama Iqbal Open University (Islamabad), Correspondence and Air University (Seoul), Sukhothai Thammathirat Open University (Hyderabad, India), Universitas Terbuka (Jakarta), University of the Air (Tokyo), Indira Gandhi National Open University (New versity (Hyderabad, India), Universitas Terbuka (Jakarta), University of the Air (Tokyo), Indira Ghandhi National Open University (New Delhi), Bangladesh Institute of Distance Education (Dhaka), etc. By contrast, attempts to expand primary, secondary or technical education through distance teaching mode have been rather limited. Some of the distance universities offer programs for teachers in the traditional systems. However, these institutions *are not* equally endowed in terms of physical facilities, academic staff, management system and academic programs while some have been functioning for decades whereas others are yet in the initial stages of development.

These institutions *are not* equally endowed in terms of physical facilities, academic staff, management systems and academic programs. Some have been functioning for decades whereas others are yet in the initial stages of development. The problems of distance education in the region need to be appreciated in the context of this variety. Some questions remain for which planners and administrators must have convincing answers, e.g. is it really necessary to set up distance education institutions, is it worthwhile to invest in them, are the people favorably disposed to the concept of distance teaching, are the institutions able to maintain the same quality and standard of other institutions?

The following section addresses these problems and issues.

A. Quality

Concern for quality in education, particularly higher education, is expressed in most policy and planning documents. It is a perennial question which recurs at a time when even the best institutions in many countries of this region are under serious strain with shortages of adequately qualified teachers and a lack of appropriate teaching and research facilities. At the same time, pressure for greater access and increased enrollments is mounting and the situation is further exacerbated by limited financial resources.

The popularity of distance education arose out of its presumed ability to respond to such new pressure quickly and at a minimum cost. As a result the newly established distance education institutions have been developing rapidly but in many instances without matching resources. Setting up a new university is usually costly and time consuming. However, some of the open universities started to function in somewhat makeshift conditions – even without buildings of their own for offices, production centers or libraries. Nonetheless, they have made tremendous strides and their performances in terms of output (mostly undergraduate and below) are quite impressive.

If relevance is a criterion of quality, then there is no cause for concern over quality in these new institutions. Courses offered by the newly established open universities by and large are need based. For example, the one million students of the Central Radio and Television University (CRTVU) system in China are working adults. Nearly 85 per cent of the 400,000 students of Sukhothai Thammathirat Open University (STOU) are on their jobs. The Bangladesh Institute of Distance Education (BIDE), which has just started, offers a program only for the training of undertrained teachers of secondary schools. Allama Iqbal Open University (AIOU), the first of its kind to have been established in this region, lays strong emphasis on the training of primary school teachers, literacy workers, village leaders side by side with its degree programs both at the undergraduate and graduate levels.

Doubts are often expressed over the standards of courses and the levels of achievement reached in distance education. There is also a propensity to draw comparison between the distance teaching and the traditional universities. While such reactions seem understandable, there is no evidence to show that in comparable situations one approach is necessarily superior to the other. One university in Australia reports the level of achievement by external students as superior to their on-campus counterparts. It is reported that the graduates of STOU are doing equally well or in few instances even better than the graduates of the conventional universities in the entrance examination for postgraduate studies. Quality is relative, the issues pertaining to quality of distance education can best be appreciated in a specific context. Nevertheless, maintaining quality becomes all the more difficult when tertiary education tends to assume the scale of "mass education." Although the evidence of success are distinctly visible, the impact of such a large-scale expansion must be anticipated in long-term perspective. Short-term gains may be as elusive as the quality itself.

B. Programs Limitation

Closely related to the issue of quality is criticism of the limitations in the types of programs that are being offered by the distance teaching universities. One has to make a distinction between what has been demonstrated as possible and what is available. It has been pointed out earlier that it is possible to teach most courses by using distance teaching techniques. There are examples where engineering and science courses are being effectively taught. But in practice, the overwhelming emphasis is on arts, social science and humanity-based courses. A survey of UNESCO of 34 institutions in Australia, India, Pakistan, New Zealand, Sri Lanka and Thailand in 1984 has shown that degree programs in science and engineering-related fields are offered in a few institutions and that these are mostly located in Australia.

The CRTVU system has recently started a massive program in engineering and technical education using television in a network of classrooms throughout the country. It makes extensive use of the local factories for practical work as many of the classes have been set up in cooperation with them and the students are mainly drawn from them. After completion, the students also return to the same factories. However, CRTVU is largely dependent on the textbooks of the conventional universities. Instructional materials, for engineering and technical courses, suitable for self-learning are yet to be developed.

The prospect of greater expansion of distance teaching institutions into science and engineering-related programs particularly at the diploma/degree level is dependent on many conditions which are by no means easy to meet in developing countries. First, development of appropriate instructional materials is a very laborious and expensive task. Second, well-equipped laboratories are often not easily available at places convenient to the students. Third, the use of electronic media for visual demonstration is quite expensive. Fourth, the close cooperation and support needed from the conventional universities and research laboratories in the sharing of their facilities may not always be forthcoming because these institutions themselves are also under severe strain. Last, the cost involved in setting up own laboratory facilities at different places can be quite high.

The CRTVU system has undertaken a large-scale project to set up its own research laboratory facilities in the Provincial Television Universities and their associated Branch Schools. It is also setting up more sophisticated laboratories at its headquarters in Beijing for research work at the TV University faculty members and advance students.

One possible way to minimize such difficulties may be to avoid duplication of effort by the separate institutions in the development of their own instructional materials. The extent to which materials already developed can be used by others and how the various institutions can join in developing new programs and materials needs to be seriously explored. The problem of language can be easily overcome by translation as the exchanging of course materials between AIOU and UK Open University illustrates. Another possibility is the establishment of a resource center or instructional materials bank in one of the existing institutions. This would facilitate access by other institutions and the use of the materials as exemplars for the development of their own materials.

C. Staff Training

The problems of distance education, be they academic, administrative or human, are interrelated. It is the human force behind any educational institutions that is most important and it is that force which makes an institution what it is. This is more so with those distance teaching institutions which are still at a development stage. Management and planning for development of distance teaching institutions is a very complex and difficult task and needs people with technical expertise as well as a vision of the future. Documentation on the process of planning of such institutions is not abundant.

The present group of administrators, academics and technical personnel of the distance education institutions have been drawn mainly from the conventional institutions, public or private media system or other sources. Very few of them have had any previous experience in distance education. However, in countries where more than one such institution exist transfer of experienced persons has proved possible. The Indira Gandhi National Open University (IGNOU) in India was fortunate to draw its leader from another established open university. Such has not been the case in other developing countries. At the initial stages most universities have had to obtain expert assistance from outside institutions. Often in-house training activities for relatively new personnel are based on the experiences of senior staff. For example, AIOU and the UK Open University have maintained close cooperation.

At present the scope for the systematic training of distance education personnel at the country or regional level and the availability of training materials are both very limited. No university or institution is known to offer courses on distance teaching as a discipline or field of study. Training usually takes place in a limited way at the institutions concerned (most often with the assistance of so-called resource persons) from other institutions, international organizations, etc.

One of the most immediate concerns is how to institutionalize the training of distance education personnel. IGNOU has taken a lead in this respect as it plans to institute diploma courses in "distance education" presumably from 1987. Inter-university cooperation both within and between countries in developing such program of study should be of particular importance because the program is likely to be of interest to other institutions in the region as well. The CRTVU has developed strategies for training of personnel in the CRTVU system. They now number several thousand throughout the country and CRTVU is building an infrastructure accordingly. That experience could be of interest to an individual institution for its own in-service training programs. Regional needs suggest that some kind of a regional training center, using an existing nucleus would also be worth exploring.

D. Technology Use

A further dilemma that confronts some developing distance teaching institutions arises out of the use of media, i.e. television and radio. Television in distance teaching is a relatively recent phenomenon and is not common to all institutions. For example, the tertiary institutions in Australia and the conventional universities in India which also have distance teaching programs rely heavily on correspondence materials and hardly take recourse to teaching by television or radio. The policy of the Open University in Sri Lanka is also the same. On the other hand, universities like AIOU, STOU, Ramkhamhaeng University, Korea Air and Correspondence University make good use of both these media. IGNOU is planning to include radio and television programs. The use of television is perhaps most extensive in the CRTVU system.

Aside from the debate on the efficacy of these powerful and exotic media, the sheer problems of logistic are enormous for new institutions. The initial capital investment in setting up production centers is quite high and is not easily within their means. Depending on the nature of the facilities to be created, the cost would normally run into several million US dollars and substantial part of may be in foreign exchange. This is further complicated by the absence of adequate information on any standardization and on the scale, number and type of educational programs that would need to be produced. Even those who have them, had to make a beginning on a modest scale, in somewhat improvised manner and with the sharing of other facilities. To upgrade facilities involves enormous expenses and a considerable amount of foreign aid or loans. This often tends to limit the options for the institutions concerned.

The CRTVU system makes use of the satellite to take television lessons to thousands of classrooms across the country. In a sense television is a substitute for the teacher. What is impressive is that the studio and related facilities currently available at the CRTVU and 28 other provincial television universities are modest despite the production of a huge number of programs, mostly in science and engineering related courses, but are functionally very effective. Modernization efforts are now under way with financial assistance from the World Bank.

Experience has shown that institutions need to have their own facilities to ensure the quality of the programs and maintain time schedules. Moreover, distinction needs to be made between instructional programs and other programs. In the institutions that are concerned more with the instructional programs, production requires continuous interaction between academics, directors, producers and technical staff. In this respect what seems to be important is how to minimize the cost of setting up and maintaining such centers without compromising their quality. Exchange of information on the experiences of the various institutions keeping in view the future need in the context of rapid technological changes both merit serious consideration. It may also be worth exploring how such facilities could be shared by other institutions both within and between countries particularly for basic science and engineering courses. This may possibly help avoid or at least reduce costly mistakes and duplications.

E. Research and Documentation

Research on institutional development in distance education has not been carried out extensively in this region at the institution or system level. Nor has there been extensive documentation on the experiences of the various systems. What is commonly available are the reports of meetings, seminars, conferences and descriptive catalogues. Some associations and institutions bring out journals and newsletters which may contain research articles. But there is a dearth of critical studies on some basic aspects related to distance education, planning and management.

One must, however, recognize that the research needs of the older institutions like the ones, for example, in Australia may be different from those of the newer institutions in the developing countries. Because self-evaluation or appraisal has been a part of the management and teaching-learning process in those institutions during the long period of their existence, their research interest tends to lie in the "micro" aspects of distance education.

On the contrary, for the relatively new distance education institutions in the developing countries, their problems are somewhat peculiar to their special functions. Because the mission of these institutions is urgent, the scale of operation is far too large, resources are limited and the socio-cultural context are complicated. In such a situation there is a greater need for research even though these institutions have been able to generate a great deal of public confidence in them. As one takes into account the concerns that are commonly expressed, a series of studies need to be undertaken to establish a strong impirical database to be used to more effective planning and management. These may include topics such as cost-effectiveness in long and short perspectives, quality and relevance of academic programs, graduate employment, failures and withdrawal, media use in the context of teaching and learning, cost and infrastructure, indicators of institutional performances, and interface between the conventional and distance education system. Inter-institutional collaboration in such projects would facilitate wider use of these studies. It is reported that IDRC has initiated a number of such research projects.

THE PROSPECT AND CONCLUSION

Distance education no longer needs to prove itself. It has become firmly established in many countries – developing countries and developed. The only questions remaining are how much further it will go and in what variety it will occur. The evidence to date clearly indicates that escalation is to be expected. Because of the growing demand these institutions are likely to grow and their activities are likely to become more diversified. So long as there are potential consumers who live at a distance from educational centers, so long as people for one reason or another cannot gain access to the established formal system, the demand for an alternative form of educational delivery will continue. Given also the steadily increasing cost entailed for those who must relocate themselves or travel long distances in order that education is accessible to them, the achievement of equity is also dependent on alternative delivery systems.

Theoretically the demand could peak but the demographic data imply that this time is far off. Within the foreseeable future more institutions will need to be established particularly for higher education and more students will need to be accommodated within existing institutions.

Understandably, the initial tendency may be to focus on the quantity problem – developing a supply sufficient to cope with the demand in quantitative terms. Predictably, however, the focus is likely to change – probably in two ways. First, there is likely to be some tendency for institutions to further diversify their program and develop specialities. Second, it is predictable that greater emphasis will increasingly be given to qualitative aspects. Both are discussed below.

In the face of a widespread but geographically dispersed demand for a particular type of education, it is predictable that the distance education format will be employed. For example, in New Zealand, the Advanced Studies for Teachers Unit exists solely to cater for the in-service education already trained and practicing teachers. Other countries as well have used distance education as a means for both training and upgrading teachers. Programs for teacher training are likely to be increased in a number of developing countries. It also seems evident that because of the rural base from which agricultural workers must operate, distance education in agriculture and horticulture is likely to be used more and more as the means for rural improvement. Other areas that seem particularly apt for specialization are to be found wherever small enterprises are dispersed through the country in any number. At the higher education level greater emphasis is likely to be placed on science, engineering and technology bases courses. The limiting factor appears to be the extent of the demand – scope is no longer a problem.

Again, it is the case that established institutions – which often have a vested interest to protect – have ventured criticisms of distance education programs. However, the evidence suggests that the students achievements by distance education methods are no worse and sometimes appreciably better. This can be explained partly by the stronger motivation and greater motivation of distance education students – many of whom are older and were experienced than their on-campus fellows. It can also be gently explained by the quality of some of the distance education courses. Because distance education materials are by definition accessible and public, there is considerable social pressure for their intellectual and educational standards to be high. This contrasts with the relatively concealed character of most internal courses. Nonetheless, the quality of courses depends on quality controls. Recent years have seen a growth in the field of course design – both in terms of the educational strategies used and in the formatting, production and presentation. Predictably this trend will continue and more refined systems will be developed both to ensure quality and speed up production.

For some years the issue of technology has been a vexed one. Initially mass broadcasting was seen to be an answer. This, however, ran into scheduling difficulties in that broadening times were not always convenient for the target audience. Then 'narrow casting' – the use of easily transportable audio tapes, video tapes and more recently 'floppy' and 'compact' discs – was thought to be the answer. Currently, interest is focused on 'interactive learning' and the scope that the new technologies give for improving the education process. Networking systems and data bank will feature primarily in plans for new developments. Obviously, distance education systems provide an excellent proving ground for such developments. While it is difficult to predict where technology will lead education, one of the scenario under consideration is home-based education.

If distance education is to develop fully and serve the purposes given to it, appropriate research is also needed into various aspects of it including the field of adult learning. Much of learning theory is child oriented, often based on development theories that have regard for the young human rather than the mature one. It is not necessarily the case that the best ways of educating adults have yet been found.

There is then, a range of possibilities in distance education and at various levels that can engage the minds of planners and developers into the foreseeable future. Without question, distance education will continue to expand and will greatly influence the educational scenario of the future. The kind of quality it achieves, will depend on the quality of mind brought to bear on it.

Application of Distance Education in Formal and Non-Formal Education

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INTRODUCTION

A. Definitions: Distance Education, Formal and Non-Formal Education

Discussion of definitions of the term "distance education" has been quite widespread (e.g. Peters,[1] Moore,[2] Holmberg[3]). The essence of such discussion tends to generate a consensus, summarized succinctly by Perraton,[4] that distance education is an education process in which a significant proportion of the teaching is conducted by someone removed in space and/or time from the learner. It only need be added that such independence of place and time of delivery of instruction inevitably entails the use of a range of instructional media, which serves to minimize the role of conventional face-to-face teaching.

While the use of written instruction in the form of printed study guides is a major facet of most systems, distance education should not be equated solely with correspondence education. In the last decade or so, distance education has made increasingly extensive use of a wide range of instructional media including broadcast radio and television, audiotapes, videotapes, telephones and computers in conjunction with print materials. The use of such potentially powerful multimedia instructional packages has raised the exciting possibility that distance education as a mode of instruction might well supplement or even replace a significant proportion of conventional face-to-face teaching in both developing and developed countries.

The potential scope of distance education initiatives extends across the fields of both formal and non-formal education. Formal education refers to courses of study that lead ultimately to an accredited award such as a school certificate, diploma or degree from a recognized educational institution or professional body. In this context, distance education has been used in the service of all levels of formal education – primary, secondary, tertiary and continuing professional education. Non-formal education is characterized primarily by the fact that such courses of study do not lead to a recognized accredited award. Such non-award courses tend to encompass community education programs, continuing education courses taken for personal development and vocational education and training conducted specifically to meet the specialized needs of employers. The demand for non-formal education seems likely to continue to expand since it is unrealistic to expect that during the relatively limited period of formal education; either at school or in their initial vocational education, people can develop sufficient knowledge and skills to last a lifetime in a fast changing social and economic world. Non-formal education seems likely to have an increasingly salient role to play in allowing many people to take advantage of emerging opportunities for personal development, changes of occupation and job satisfaction. Distance education as a mode of instruction appears to have the potential to make a significant contribution to the cost-effectiveness of both formal and non-formal educational programs.

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[1] Peters, O., *Die Didaktische Strukur des Fernunterrichts*, Untersuchungen zu einer industrialisierten form des lehrens und lernens, Weinhem, Beltz, 1973.

[2] Moore, M.G., "Toward a Theory of Independent Learning and Teaching," *Journal of Higher Education*, 1973, pp. 44, 661–679.

[3] Holmberg, B., *Distance Education: A Survey and Bibliography*, London, Kogan Page, 1977.

[4] Perraton, H., *Alternative Routes to Formal Education*, Baltimore, John Hopkins University Press, 1982.

B. Scope of the Paper

This paper examines the role of distance education in national development through consideration of the scope and limitations of the application of this mode of instruction in both formal and non-formal education settings. A more detailed analysis of the potential efficacy of distance education as a mode of instruction is included, however, since the emergent guidelines are generalizable across a wide range of learning contexts and specific applications.

The need for a multidisciplinary team approach to the design and development of instructional materials for use in distance education is outlined prior to consideration of the scope and limitations of major instructional media mix for the application of distance education to an existing learning context.

A more detailed review of the infrastructure required to guarantee the production of high quality instructional resources is used to highlight the need for cooperation if distance education is to optimize its potential for cost-effectiveness. Discussion of possible constraints working against the facilitation of collaborative efforts and possible strategies for overcoming such problems precede consideration of a range of distance education projects that are apparently capable of making a significant contribution to human resource development needs in the Asia-Pacific region. The potential role of the Bank in generating cooperative ventures designed to optimize cost-effectiveness in distance education in the region is finally considered.

APPLICATIONS OF DISTANCE EDUCATION

A. Scope of Distance Education Offerings

If one examines the extensive range of existing applications of distance education, it would appear that this mode of instruction is already making a significant contribution to national development in many and varied teaching-learning contexts. An initial study undertaken by the International Centre for Distance Learning (ICDL) in 1983 revealed that nearly 2 million students were studying via the distance education mode.[5] The ICDL has continued its role of gathering data on distance education and has created two major resource collections consisting of a documents' collection and a computerized database, respectively. By far the largest section of the document collection consists of prospectuses, reports, journal articles and papers relating to distance education in over 80 countries at all educational levels.[6] The database also provides information on distance teaching institutions. The initial data collection exercise conducted in 1983/84 generated responses from 400 institutions while the 1984/85 update brought in responses from over 500 at all educational levels. A detailed review of the scope of all the programs offered via the distance education mode is clearly beyond the scope of this paper, but further comment, on the range of subject areas covered, should lend support to the general assertion that there is very little that cannot be taught at a distance in an intellectually honest manner.

B. Application of Distance Education to Formal Education

In 1983, during the Sixth Biennial Forum of the Australian and South Pacific External Studies Association (ASPESA), it was suggested that one of the most pressing needs of the Association was a register of all tertiary level courses offered externally in Australia. Such a directory of external higher education courses has since been produced. The 1985 version of the directory lists no less than 163 different subjects in the index. The subjects covered all contribute to the award of a formally accredited tertiary qualification, including Associate Diplomas, Bachelor's Degrees, Graduate Diplomas, Master's Degrees and Doctor of Philosophy. While, as Johnson has reported, the biggest fields of study by enrollment are business/commerce/economics, teacher education, some humanities and social sciences, and applied science, the range of subjects includes such diverse offerings as cartography, climatology, electronics, pathology and slavonic studies to name but a few.

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[5] Perry, W., "State of the Art of Distance Education Worldwide," *Never Too Far: A Newsletter for Distance Education*, 1985, No. 5, pp. 3–4.

[6] Harry, K., *The International Centre for Distance Learning of the United Nations University: Resources and Services*, 1986.

It is probably true to say that until such a publication became available, few distance educators were aware of the range and diversity of distance education offerings. Indeed, it is somewhat ironic that in years gone by it was not unusual to hear distance educators themselves declare that only a limited number of discipline areas could be taught at a distance. This is because the early distance educators concentrated mainly on those subjects which could be taught via print-based materials. They were then caught up in a web of their own limited thinking and failed to realize that when the wider range of media became available it was consequently possible to teach a much broader range of discipline areas. For example, the advent of computer-based education techniques has made it possible to teach at a distance subject areas previously thought to be beyond the capacity of that mode of instruction.

One of the favored arguments by the opponents of distance education is that engineering cannot be taught at a distance. For the past eight years, however, engineering at the subprofessional level has been taught successfully at a distance in Australia. It is worthwhile spending a little time explaining how engineering is taught at a distance so as to demonstrate that distance education need not be restricted to the social sciences.

Engineering is taught at three levels: trade, subprofessional and professional. The subprofessional level is the area in which there was the greatest demand in Australia, and it was the area which was first taught at a distance. This was because of the shortage of graduates and the distance at which mining and construction took place away from conventional on-campus centers. There are about four subprofessional engineers required for every professional graduate. The subprofessionals are involved in an on-the-job supervisory capacity. They are the ones who actually supervise the workers in bridge or road building and in mining operations. The course is four years part-time post-matriculation. The most obvious problem is how best to teach the practical components of the course. There are a range of techniques used including short residential schools on the main campus or at major off-campus centers; the use of more senior people at the student's workplace to supervise and record practical work in logbooks; and the use of portable experimental kits, including microprocessors. Of course, the advent of powerful and relatively cheap microcomputers also means that off-campus students need lose little in comparison with their on-campus colleagues.

A step forward of even greater significance has taken place in Australia in the past year with the acceptance by the Australian Institute of Engineers that fully professional Bachelor of Engineering students may now study at least part of their course in the external mode. This is due to a recognition by the Institute of Engineers that the para-professional diploma taught at a distance has been a resounding success and that much of the fully professional course can now also be taught this way. There is some discussion as to whether one-half or two-thirds of the professional Bachelor of Engineering course can be taught externally, but there is little doubt that within a few years the whole of the professional course will be available to external students despite the fact that the engineers were one of the more conservative groups, who long resisted the advent of distance education into their discipline area.

The slow acceptance of distance education in some sectors of the educational arena is despite its long history. For example, de Freitas, Lynch and Sweitzer[7] reported that correspondence programs have been actively used for more than 250 years. During the twentieth century, correspondence study programs were intensified and increasingly acknowledged by society and government as a way to promote educational democratization. Driscoll[8] pointed out that in 1970 more than five million people were engaged in correspondence studies under the auspices of the National Home Study Council. Although in existence for some time, correspondence programs continue to flourish; for example, the National University Extension Association[9] listed over 12,000 courses offered by 69 accredited institutions. Increasingly, however, such courses do not depend solely on written instruction, but make use of a wide range of other instructional media, including radio, television, telephone and computing facilities. Such developments have tended to attract the interest of international agencies, including the United States Agency for International Development (USAID) and the World Bank.

In 1964, for example, Venezuela and the USAID signed an agreement by which Venezuelan technicians would enroll in a correspondence course offered by the University of Wisconsin. Padron[10] reported that by 1971 over 20,000 enrollees had registered for the international correspondence course. Further, the World Bank[11] published a two-volume work concerned with various uses of radio for educational purposes in several countries, including Brazil, Mexico, Nicaragua and several African countries. In Kenya, for example, the combination of radio and correspondence education has been used successfully for the in-service training of teachers since the middle 1960s.

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[7] de Freitas, K.S., Lynch, P.D. and Sweitzer, R., "Nontraditional Study Program: An Overview," *ICDE Bulletin*, 1986, No. 12, pp. 37-46.

[8] Driscoll, W.J., "New Developments and Changes in Independent Study: USA," *Convergence*, 1972, Vol. 5, No.2, pp. 26-35.

[9] *Guide to Independent Learning Through Correspondence Instruction 1980-82*. A Peterson's Guide Publication for the National University Extension Association, 1982.

[10] Padron, H., "El Instituto Nacional de Cooperacion Educativa," *Convergence*, 1972, Vol. 5, No. 2, pp. 60-65.

Holmberg[12] described a number of ongoing Kenyan distance education programs that have received some support from the German Foundation for International Development. One of these programs is concerned with the training of temporary teachers, who have no previous teacher training and generally a poor educational backgroumd. Their training program has to encompass English (the teaching language in Kenya from grade four), Kiswahili, mathematics, science, religion, history or geography, art or music, agriculture or home science as well as a course on educational theory and methodology. In 1985, 4,500 temporary teachers, all with at least three years teaching experience, were enrolled in the course, which uses traditional correspondence materials combined with intensive residential face-to-face sessions and some radio broadcasts. Successful completion of the course results in teacher certification which is accompanied by permanent employment, considerable salary increases, pension benefits and social prestige. This program is of particular interest since many of the students have "poor general education – sometimes only a seven-year primary education – as background".[13]

An emphasis on teacher education was also a significant feature of the initial development of a distance education program at the University of the South Pacific (USP). Established in 1968, USP serves the needs of 11 English-speaking nations, with a combined population of approximately 1.5 million people, scattered over 11 million square kilometers of ocean. While most parts of the region had well-established elementary school systems, the Diploma in Education was offered at a distance to train teachers of children in the 11 to 15 year-old age group in order to extend the availability of junior secondary education. Gillard and Williams[14] reported that USP now offers a wide range of distance education courses at three levels: predegree, subdegree (diplomas and certificates) and degree. The predegree courses are necessary because of the various levels of output from secondary schools in the region.

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[11] *Radio for Education and Development: Case Studies*, Washington D.C., The World Bank, 1977.

[12] Holmberg, B., "Applications of Distance Education in Kenya," *Distance Education*, 1985, Vol. 6, No. 2, pp. 242–247.

[13] Holmberg, *Ibid*, 1985.

[14] Gillard, G.M. and Williams, A.I., "Satellite and Kerosene Lamp: Distance Education at the University of the South Pacific," *ICDE Bulletin*, 1986, No. 12, pp. 57–61.

Such variation demands that the University offers two types of "bridging" courses: Preliminary and Foundation which are equivalent to sixth-form and seventh-form secondary education, respectively. Roberts[15] highlighted the fact that in 1985 pre and subdegree students accounted for 36 per cent of USP's enrollments. Additionally, Roberts quoted figures that demonstrate the extent of the University's commitment to distance education, with almost 60 per cent of the students enrolled in credit courses studying under the auspices of Extension Services. Further, the initial emphasis on teacher education has shifted somewhat so that the range of offerings now encompass accounting, administration, economics and technology-based courses such as engineering drawing.

Similarly, in Asia, there is evidence of a diverse range of distance education applications. As Carr[16] has highlighted the academic programs offered by various Asian universities involved in distance education show some interesting contrasts. For example, although Thailand's Sukhothai Thammathirat Open University (STOU) concentrated initially on education programs for teachers and educational administrators, it now provides a wide range of courses including management, science, law, health science and agricultural extension. In China, the Central Broadcasting and Television University has stressed science and technology, although social science was introduced in 1983. Further, Zhou Jianshu[17] reported that in the Beijin Municipality, universities and colleges offered courses by correspondence in more than 140 specialties, including agriculture, medicine, law, finance and foreign languages.

In contrast, Harwood and Kim[18] made the point that almost 47 per cent of enrollments at the Korean Correspondence University were concentrated in business and public administration, with elementary education and home economics comprising approximately 29 per cent of the enrollment. Agriculture had 11 per cent of students, with English, law and early childhood education together constituting the remaining 13 per cent. Further, in some cases such as the University of the Air (Japan) and the Correspondence Institutes in India, the programs provided have primarily been an extension of traditional university education. In India though, this situation may change with the establishment of the Indira Gandhi National Open University (IGNOU). An international seminar, which followed the formal opening of IGNOU in

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[15] Roberts, D.W., "Very Distant Education at USP," *Aspesa Occasional Papers*, 1986, No.1, pp. 5–12.

[16] Carr, R., "Distance Education in Universities: The Asian Experience", *ICDE Bulletin*, 1986, No. 10, pp. 30–33.

[17] Zhou Jianshu, "News from China," *ICDE Bulletin*, 1986, No. 11, pp. 23–25.

[18] Harwood, F.R. and Kim, S.H., "Seoul's Super School," *ICDE Bulletin*, 1986, No. 8, pp. 54–57.

November 1985, included discussion of the need to "keep in mind national goals, Planning Commission reports, growth pattern, job potential, Employment Exchange registrations for different types of jobs, need of in-service training for different vocations and functional literacy needs of adults"[19] when identifying prospective courses. Such a range of concerns suggests that the eventual range of course offerings might well extend beyond the traditional range of university courses and extend to the non-formal education arena.

C. Application of Distance Education to Non-Formal Education

In the field of non-formal education, there is also evidence of a change of attitude towards the use of educational methodologies developed primarily in the service of distance education. Many institutions identified primarily in terms of their contribution to formal education also participate in the non-formal education context. In Asia, for example, the Allama Iqbal Open University (AIOU) has undertaken a range of interesting developments in functional literacy/education involving the delivery of non-credit courses in such areas as soil problems, poultry farming and tractor repair and maintenance. Additionally, it has undertaken several Integrated Functional Educational Projects on literacy and vocational and community skills, as well as the Functional Education Project for Rural Areas, which has involved field-testing and evaluating instructional materials in selected village settings.

Similarly, the Home Studies Program of the University of Life in Manila, has concentrated on practical non-degree courses in subjects as diverse as fruit and vegetable production, salesmanship and financing a small business. Further, the STOU has established cooperative ventures for staff development with several agencies including the Department of Local Administration, the Police Department and the Bank of Bangkok. The importance of non-credit courses at the USP is reflected in the fact that in 1985 Extension Services ran a wide range of mainly vocationally oriented short courses for more than 2,000 students, approximately 30 per cent of total enrollments for the year.[20] Finally, in India, Gujarat Agricultural University has successfully conducted correspondence courses for more than 5,000 farmers[21] in such areas as cattle care, preservation of fruit trees and cotton-growing.

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[19] Singh, B., "International Seminar on Distance Education: Experience of Open Universities, Indira Gandhi National Open University, New Delhi, India." *ICDE Bulletin*, 1986, No. 11, pp. 35–41.

[20] Roberts, D. W., "Very Distant Education at USP," *Aspesa Occasional Papers*, 1986, No. 1, pp. 5–12.

[21] Shah, G.B., "Distance Education for the Third World" *ICDE Bulletin*, 1986, No. 12, pp. 53–56.

An interesting application of distance education has been developed for paramedical staff and nurses in Kenya.[22] There are about 18,000 paramedical staff, with those in remote areas having to undertake a number of tasks normally assigned to doctors where available. Such tasks include making diagnoses, deciding on and giving injections, and suturing wounds. Among the subjects covered by the distance education program, in which 800 students are enrolled, are communicable diseases, nutrition, genealogy and obstetrics, maternal and child care. After completing their studies, based primarily on traditional correspondence methods, these health workers take examinations, success in which confers prestige, but neither official recognition nor financial reward. Distance teaching techniques are also acknowledged as valid in the field of continuing medical education at a professional level. For example, the Royal College of General Practitioners have begun planning a distance education program for all its 11,500 general medical practitioners in the United Kingdom.[23] The same authors also reported a similar initiative undertaken by the Pharmaceutical Society of Great Britain for its 33,500 members. In conjunction with the aforementioned developments in engineering education in Australia, these examples demonstrate that the prejudice against distance teaching is breaking down, and that educators should not be limited in their thinking as to the role that distance education can take.

There is also evidence of the widespread application of distance education as a mode of instruction in the field of industrial training. The United Kingdom's Open Tech program is intended to help adults secure training, retraining or updating in technician and supervisory skills and knowledge to meet clearly identified labor market needs[24] primarily through the application of distance education methodologies. The specific projects engendered by the Open Tech initiative are probably typified by the open learning program being developed at various Imperial Chemical Industries (ICI) plants throughout England.[25] Ten separate ICI locations are involved. A diverse range of target populations and subject matters are involved, including the training of: office personnel in the use of a new corporate personnel database, junior engineering designers in electrical instrumentation, engineering craftsmen in effective maintenance and process operators in plant operations. Through similar schemes stimulated by the Open Tech initiative, a total of more than 1,000 training modules representing over 14,000 learning hours in a vast range of vocational training areas has been produced in just four years. Further, a recent edition of the "Open Tech Program News" included a supplement which outlined 120 current projects, covering a wide range of subject areas from mushroom production to aviation studies. The extent of this open learning explosion is reflected in Freeman's[26] report that distance learning packages are now available from over 300 separate producers in the United Kingdom alone.

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[22] Holmberg, B., "Applications of Distance Education in Kenya," *Distance Education*, 1985, Vol. 6, No. 2, pp. 242–247.

[23] Dunn, W. R. and Hamilton, D. D., "Competence-Based Education and Distance Learning: A Tandem for Professional Continuing Education", *Studies in Higher Education*, 1985, Vol. 10, No. 3, pp. 277–287.

[24] Tolley, G., "The Open Teach Program," *ICDE Bulletin*, 1983, No. 1, pp. 43–47.

[25] Foggo, T., "Open learning in ICI," *Open Learning*, 1986, Vol. 1, No. 1, pp. 13-15.

This type of industry-based initiative was established in India almost 20 years ago. Shah[27] reported that in 1968 the Government of India and the Reserve Bank of India were instrumental in setting up a National Institute of Bank Management, which produced programmed learning texts to standardize training on such topics as "Preparation of Vouchers" and "Traveller's Cheques". Similarly, in 1975, the Life Insurance Corporation in India adopted the programmed learning strategy for training new agents, and has since produced programmed learning text on topics like "Introducing Life Assurance" and "Plans for Life Assurance". These texts have been translated into ten Indian languages and have been used by more than 100,000 new agents for the purpose of self-instruction. Finally, Shah[28] outlined the role of the Training Institute attached to Rashtriya Chemicals and Fertilizers Limited. The Institute is responsible for the training of technicians, operators, engineers and managers, and has successfully used programmed learning texts for such purposes.

In Australia, the Southern Cross Corporation has made a major investment in distance education.[29] The Corporation replaced its traditional centralized training system with a system based on distance education to cater for the training needs of personnel in its sales and servicing branches, which employ more than 300 people at centers throughout Australia, New Zealand, Papua New Guinea and Fiji. The manufacturing branch of the Corporation designs and produces a wide variety of water supply equipment, including pumps and windmills, for both rural and industrial applications. The distance education course is aimed at the training of technical sales representatives, who are faced with the complex task of analyzing customer needs, matching these with appropriate design specifications, and subsequently costing the installation and costing the complete water supply systems. The overall training program consists of ten separate courses, covering such topics as "Engineering Materials", "Water Sources", "Hydraulics", "Centrifugal Pumps" and "Irrigation". The instructional materials are primarily print-based, but also include samples of engineering materials, a working model of a windmill and a series of videotapes. An interesting feature of the training was the Corporation management's decision to allow categories of staff other than trainee sales representatives to enroll in the program. As a result, clerical staff, spare parts counter staff, erection staff, truck drivers and senior executives have all participated successfully in the program. Further, evaluation of the initiative demonstrated that higher levels of competence were achieved, while training costs were reduced by 72 per cent. It appears that training systems based on distance education techniques offer a cost-effective means of satisfying the education and training needs of large industrial and commercial organizations, which employ networks of personnel distributed over large geographical areas.

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[26] Freeman, R., "MARIS-NET; A Service Run by the National Extension College and the Scottish Council for Educational Technology," *ICDE Bulletin*, 1986, No. 12, pp. 50–52.

[27] Shah, G.B., "Distance Education for the Third World," *ICDE Bulletin*, 1986, No. 12, pp. 53–56.

[28] Shah, *Ibid.*, 1986.

[29] Oldfield, D., and Taylor, J. C., "Industrial Training and Distance Education," *International Council for Distance Education Bulletin*, 1984, No. 6, pp. 58–64.

D. Potential Application of Distance Education

An important feature of many of the aforementioned projects is that they are not aimed solely at personnel who are qualified for tertiary education, but the instructional materials produced cater for a wide range of educational levels. Given the widespread application of distance education to preschool,[30] primary,[31] and secondary education,[32] and its application across a broad range of curricula in a number of different countries,[33] in addition to the aforementioned applications in tertiary education and non-formal education, it seems reasonable to conclude that distance education can make an intellectually honest contribution to the teaching of practically any subject matter discipline in a wide variety of contexts. In short, the evidence would appear to support the view that applications of distance education are potentially unlimited. To understand how such a wide range of applications can be implemented successfully, it is necessary to examine in some detail the potential efficacy of distance education as a mode of instruction.

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[30] Harley, M.F., "An Alternative Organizational Model for Early Childhood Distance Education Programs," *Distance Education*, 1985, Vol. 6, No. 2, pp. 158–168.

[31] Penberthy, J., *Elementary Education of Children at a Distance*, Paper presented at the 12th World Conference of the International Council for Correspondence Education, Vancouver, 1982.

[32] Davis, J.E., "Distance Education Courses: Rediscovered Tools for Small Secondary Schools," *Distance Education*, 1983, Vol. 4, No. 2, pp. 195–202.

[33] Perraton, H., *Alternative Routes to Formal Education*, Baltimore, John Hopkins University Press, 1982.

DISTANCE EDUCATION AS A MODE OF INSTRUCTION

A. The Effectiveness of Distance Education

The rationale for the use of distance education as an effective mode of instruction can by no means be argued on strictly empirical grounds. The relatively recent upsurge of interest in distance education and the associated increase in the use of a range of instructional media, has meant that there has been insufficient time for adequate empirical investigation. Additionally, many distance education institutions are hard pressed to cope with the burgeoning demands for their services, with the result that insufficient resources have been applied to research. Indeed, a sufficient body of clear-cut research evidence on the effectiveness of distance education as a mode of instruction is simply not available. As a result of conducting a major review of recent research in distance learning, Coldeway[34] concluded that "There is much to be learned about research into distance learning and still more about distance learning itself." This is especially the case in systems deploying new technologies – including computer-based education and interactive videodisc. Further, there is a dearth of conclusive evidence relating to the relative efficacy of combinations of different instructional media across a variety of settings. The selection of particular instructional media for use in the distance education mode on empirical grounds must therefore await further investigation. Rather, apart from a limited amount of research on cost-effectiveness, the justification for using distance education as a mode of instruction must be made primarily on pragmatic and logical grounds.

The analysis of the economics of distance teaching is still in its infancy. A number of studies on the cost-effectiveness of this mode of instruction, however, can be used to support certain general conclusions pertaining to instructional efficacy. Wagner[35,36] analyzed OUUK operations in a very general way. However, Snowdon and Daniel[37] and Rumble[38] broadened that scope of analysis by considering institutions other than OUUK. Carnoy and Leven[39] commented on Wagner's work while Mace[40] was highly critical of it. Other contributors to the debate have been Laidlaw and Lanyard,[41] who looked at the structure of OUUK course production cost, and Lumsden and Ritchie,[42] who compared the OUUK and conventional university output. In Australia, work has been done by Sharma[43] with a comparison of external studies and on-campus costs at a mixed mode institution, and by White,[44] who looked at the external studies costs at a College of Advanced Education. However, many of these studies went beyond a consideration of the effectiveness of distance teaching and also considered a variety of administrative aspects.

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[34] Coldeway, D.O., "Recent Research in Distance Learning." In J.S. Daniel, M.A. Stroud and J.R. Thompson, *Learning at a Distance: A World Perspective*, Edmonton, Athabasca University/International Council for Correspondence Education, 1982.

[35] Wagner, L., "The Economics of the Open University," *Higher Education*, 1972, No. 2, pp. 159–183.

[36] Wagner, L., "The Economics of the Open University Revisited," *Higher Education*, 1977, 6, pp. 359–381.

[37] Snowdon, B. and Daniel, J., The Economics of Small Open Universities, Paper presented to the Open University Conference on Distance Education, Birmingham, 1979.

[38] Rumble, G., "Economics and Cost Structures," In A. Kaye and G. Rumble (eds.), *Distance Teaching for Higher and Adult Education*, London, Croom Helm, 1981.

The studies detailed above show that the techniques immortalized by the OUUK (i.e. radio and television) have proved to be expensive and their cost-effectiveness has been questioned. Wagner argued that if broadcasting was removed, OUUK costs would fall by 25 per cent. Mace supported this aspect of Wagner's work. This reliance on the more spectacular distance teaching techniques has resulted in teaching costs in OUUK being 4.5 times as expensive as in Canada according to Snowdon and Daniel, and being ten times as expensive as in Australia according to White.

Additional evidence presented by Rumble supports the argument that the more conventional teaching technique of print materials is the most effective option. His work in South America demonstrated that print occupied nearly 70 per cent of the time students spent on study, but accounted for less than 20 per cent of the course cost. Conversely broadcasting costs were over 60 per cent of the total teaching costs, but occupied only 4 per cent of student study time.

The fact that print materials are probably the most effective means of teaching at a distance is becoming widely accepted by distance educationists. An unpublished study by Professor John Sparkes of the OUUK within his faculty of Educational Technology highlighted the fact that print was also the preferred learning medium of his students.

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[39] Carnoy, M. and Leven, H.M., "Evaluation of Educational Media: Lorne Issues," *Instructional Science*, 1975, No. 4, pp. 385–406.

[40] Mace, J., "Methodology in the Making: Is the Open University Really Cost-Effective?" *Higher Education*, 1978, No. 7, pp. 295–309.

[41] Laidlaw, B. and Lanyard, R., "Tradition Versus Open University Teaching: A Cost Comparison," *Higher Education*, 1974, No. 3, pp. 439–468.

[42] Lumsden, K.G. and Ritchie, Ç., "The Open University Teaching Methods: A Cost Comparison," *Instructional Science*, 1975, No. 4, pp. 237–291.

[43] Sharma, R.D., *The Economics of Distance Education in an Integrated Tertiary Education System*, Paper presented at the ASPESA 6th Biennial Forum, Toowoomba, 1983.

[44] White, V.J., *The Economics of Distance Education in an Australian College of Advanced Education System*, Paper prepared for the Australian Council of Directors and Principals of Colleges of Advanced Education, 1985.

However, although the developed nations are largely using print as their preferred instructional medium, this argument cannot necessarily be extrapolated to encompass developing countries. It may well be that given cultural, geographic, language and regional characteristics, other media may be more applicable.

Despite the apparent dearth of generalizable research evidence on the effectiveness of distance education as a mode of instruction, there is a significant amount of pragmatic evidence. The pragmatic justification can surely be based on the aforementioned fact that more than two million students in a huge variety of courses around the world are actively participating in distance education programs. The continued institutional support in terms of the investment of both human and physical resources would hardly be maintained without an acceptable level of effectiveness. Neither would so many students continue to invest time, money and effort into their off-campus studies without distance education providing an adequate means of instruction.

In addition to the pragmatic justification, there exists an extensive literature on the theoretical analysis of instructional media used in distance education, which provides a strong case for the logical justification of the effectiveness of distance education as a mode of instruction. The elaboration of this logical justification provides the most useful practical guidelines for optimizing the effectiveness of distance education. Consideration of approaches to generating high quality self-instructional materials (based on the selection of appropriate media for different types of subject matter and various student target populations) constitutes the major portion of the discussion of the effectiveness of distance education as a mode of instruction. The principles enunciated in the following pages should enable the managers of distance education systems to maximize the effectiveness of their instructional programs, despite the apparent dearth of generalizable empirical research findings.

B. Methodologies and Media

In both distance and conventional systems of education, discussion of modes of instruction can usefully be enhanced by drawing a distinction between instructional methodology and instructional medium. An instructional methodology is a way of organizing a series of learning experiences for students in order to achieve particular learning outcome. Instructional methodologies encompass a wide range of approaches including programmed instruction, mastery learning, inductive thinking, group investigation and so on. For example, Joyce and Weil[45] have documented 23 different instructional methodologies, which they call models of teaching, appropriate for achieving a variety of learning outcomes. An instructional medium, on the other hand, is a system of communication – a means of exposing students to particular learning experiences. Instructional media include print materials, audiocassettes, videotapes, computers and, of course, human teachers.

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[45] Joyce, B. and Weil, M., *Models of Teaching*, 2nd edition, New Jersey, Prentice Hall, 1980.

Instructional methodologies and instructional media are distinct. There is no one medium tied to a particular methodology. For example, programmed instruction can be delivered by textbook, by audiovisual means or by computer. While a certain instructional medium may be well suited to deliver a particular instructional methodology, such as using video to demonstrate psychomotor (e.g. manipulative) skills, by and large, instructional media are multifunctional and can be used to deliver a wide range of instructional methodologies. Distance education, like face-to-face teaching, may encompass the use of a wide range of instructional media and an almost limitless array of instructional methodologies. In this sense, apart from the difference in emphasis on face-to-face interaction, distance education and conventional (on-campus) education are equivalent. The only other major difference between the two is that, in distance education, there is a tendency to capture a permanent record of instruction in print or by electronic means, whereas traditional education, because of its emphasis on face-to-face teaching, tends to be ephemeral. Distance education provides a relatively permanent resource, whereas conventional education does not. From this perspective, distance education cannot strictly be classified as a teaching methodology, but is better regarded as a mode of instruction which, by its very nature, minimizes face-to-face interaction but engenders the use of a range of instructional media. By comparison, conventional education could usefully be regarded as a mode of instruction, which maximizes face-to-face interaction, somewhat at the expense of encouraging the use of a range of instructional media. Such differences have several implications for educational efficacy and, indeed, the likely cost-effectiveness of educational systems.

Since distance education, in its purest form, aims to be independent of both time and place of delivery of instruction, it has to emphasize self-instructional techniques which entail the capture of a permanent record of instruction in print or by electronic means to enhance flexibility of delivery. Such capture engenders an emphasis on instructional design and development, not least because of the expense involved in the production of distance education materials (printed study books, audiotapes, videotapes, computer packages, etc.) and the fact that such concrete manifestations of the instructional process are open to public scrutiny and evaluation. The use of a range of media in distance education, as a substitute for traditional face-to-face interaction, has led to a demand for a more systematic, analytical approach to the design and development of instruction. In turn, this multimedia approach has led to the use of multidisciplinary course teams, since it is rarely possible to find the range of expertise required to make the best use of electronic media (or print for that matter) in a single teacher. The work of such teams tends to entail detailed analysis and systematic pre-planning of instruction far beyond that normally associated with the preparation for traditional face-to-face teaching, where the emphasis is on delivery, rather than on design and development, of instruction. Further, the multidisciplinary team approach has been enhanced by the relatively recent emergence of instructional designers – specialists in the process of instruction. The availability of instructional design expertise has created the potential for a significant improvement in the quality of teaching and learning in all spheres of education.

C. Instructional Design

To understand what instructional design is, it is helpful to differentiate curriculum and instruction. Curriculum is concerned primarily with *what* to teach, whereas instruction is concerned primarily with *how* to teach. More specifically, instruction can be viewed as consisting of five relatively discrete activities: design, development, implementation, management and evaluation.[46] Instructional design as a discipline, is concerned with understanding, improving and applying methods of instruction. As a practical professional activity, it is the process of deciding what methods of instruction are best for generating learning experiences that will bring about desired changes in student knowledge and that will develop intellectual skills in a particular student target population for a specific course of study. The result of the instructional design process is an instructional development "blueprint" outlining what methods of instruction and what instructional media are best suited to a particular course content and specific student population. Such a blueprint not only prescribes methods and media for instructional development, but also prescribes procedures for instructional implementation, management and evaluation.

In the field of conventional education, the instructional activities of design, development, implementation, management and evaluation are primarily the concern of a single teacher, who is usually presented with a syllabus – a guideline on what to teach. Decisions on how to teach it are traditionally the sole responsibility of the teacher. While this is not much of a problem in primary and secondary education, where professional teacher education is a well-established prerequisite for appointment to a teaching position, in tertiary education and non-formal education, lecturers are usually appointed for their professional expertise in a particular discipline (e.g. engineering, accountancy, etc.) rather than for their teaching expertise. It is therefore understandable that conventional education has not undergone widespread changes with lectures, tutorials and workshops remaining predominant for hundreds of years. Further, organizational structures have evolved to maintain this emphasis on face-to-face teaching. With such a predominant emphasis on the face-to-face delivery of instruction, it is not surprising that other instructional media (audiotapes, videotapes and computer-based packages) have been slow to make an impact, especially in tertiary education. In short, in conventional education the design and development phases of instruction are likely to be of secondary importance relative to the consuming emphasis on the face-to-face delivery of instruction, whereas in distance education, this situation is reversed.

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[46] Reigeluth, C.M., *Instructional Design Theories and Models: An Overview of their Current Status*, New Jersey, Erlbaum, 1983.

In summary, distance education, by its very nature, is dependent on the use of a range of instructional media which serve to minimize the role of face-to-face teaching. The use of often expensive instructional media demands thoughtful preplanning with a concomitant switch in emphasis from instructional delivery to instructional design and development. Typically, the use of printed study guides, audiotapes, videotapes and computer-based packages demands a more systematic detailed approach to preinstructional planning than is normally associated with traditional face-to-face teaching. This use of a range of media in distance education promotes a multidisciplinary team approach to instruction, since it would be most unusual to find the range of expertise necessary to exploit a range of instructional media in a single individual.

D. Multidisciplinary Team Approach

The essential membership of a multidisciplinary team assembled to produce high-quality instructional materials comprises: subject matter expert(s), an instructional designer, media experts and technical/secretarial support staff. The instructional design phase demands a fine-grained analysis of the structure of the subject matter and the characteristics of the student target population, in light of the range of viable media available relative to the learning objectives of a particular instructional program. The result of this initial design phase is the delineation of appropriate specifications for instructional development, delivery and evaluation in the form of an instructional blueprint, exemplary key elements of which are appended (Appendix A). Certain aspects of this initial blueprint may, of course, need to be negotiated with appropriate media specialists, especially in relation to more complex technologies such as computer-based instruction. Once the subject matter expert(s) and instructional designer have finalized the detailed blueprint for instructional development, necessary media specialists and support staff will need to be called upon to operationalize the plan. Depending on the range of media selected for use, experts may be required in audiovisual production, computer programming, graphic design and so on. The major responsibilities of each of the team members relative to various phases of the learning materials preparation process are outlined in Table 1.

Table 1. Responsibilities of Team Members

Phase	Team Members	Responsibilities
Design	Instructional Designer + Subject Matter Expert(s)	1. Generate a detailed instructional development blueprint. 2. Prepare a timeline for the project.
Development	Instructional Designer	1. Train the subject matter expert(s) to use the blueprint for development. 2. Coordinate the production of learning materials. 3. Monitor the completion of tasks. 4. Manage the development team.
	Subject Matter Expert(s)	1. Produce learning materials (written instruction, self-assessment questions, scripts, etc.), according to the instructional blueprint.
	Media Specialist(s) – audiovisual – computing – graphics	1. Produce learning materials according to prescribed medium and design.
	Total Development Team	1. Review and revise learning materials.
Production	Technical Support Staff	1. Produce multiple copies of learning materials.

A more detailed discussion of the infrastructure necessary to support the multidisciplinary approach to instruction can be found below. The necessity for maintaining such a relatively expensive and complex infrastructure will become evident in the ensuing discussion of factors influencing the choice of various instructional media.

E. Choice of Instructional Media

The essence of distance education is that a major proportion of the teaching is conducted by someone removed in space and/or time from the learner. In its purest form, distance education would entail instruction that was totally independent of both time and place of delivery. Such independence would presumably maximize accessibility to educational opportunities. Thus, ideally, the instructional media used in distance education should not require the student to study at fixed times or places. In practice, this tends to mean that written instruction is maximized, while face-to-face teaching is minimized.

In principle, written instruction and face-to-face teaching can be regarded as opposite ends of a continuum, since written instruction is independent of time and place, whereas face-to-face teaching is dependent upon both time and place. Microcomputer-based education could also be regarded as being more or less independent of time and place, where students own, lease or have ready access to the necessary hardware, but in most cases (at least for the time being) students must access computer hardware in a particular place such as a regional study center, thus making computer-based education dependent on place. Similarly, the use of audio and videocasettes can be independent of time and place, provided students own, lease or have ready access to appropriate playback equipment. Even broadcast radio and television could be classified as being relatively independent of time and place, where students have access to audio and video recording equipment. It would appear then that in certain circumstances, the major forms of instructional media (print-based, audiovisual and computer-based) can meet the distance education criteria of being independent of both time and place.

Such a well-established personal student support context, in which all students own videorecorders, microcomputers and the like, is unlikely to exist on a widespread basis in any of the developed or developing countries in the Asia-Pacific region. Furthermore, even if such a sophisticated learning context did exist, choice of instructional media cannot be made solely on the grounds of flexibility of time and place. Certainly, in the first instance, selected instructional media must ideally be universally available to all students. The media selected would also need to be well-established in the sense of being not only technologically feasible, but also acceptable to both teachers and students. Preferred instructional media should also be economically viable, which means choosing the cheapest efficacious option and probably choosing a less expensive option if increased expenditure is likely to lead to only a marginal improvement in student performance. The aforementioned criteria for selecting instructional media are largely pragmatic, whereas selection on pedagogical grounds is arguably of equal importance.

Once viable practical alternatives have been determined for a particular teaching-learning context, the valid selection of media must be made from an instructional design perspective. It is important to recall that most instructional media are multifunctional and can be adapted to a wide range of instructional purposes. A particular instructional medium, while varying somewhat from other media in basic characteristics is, in the final analysis no more than a form of packaging for a specific instructional strategy. The efficacy of the instruction is likely to depend more on the quality of the instructional message than on any inherent characteristics of the instructional medium. In the context of instruction then, it is the message – not so much the medium – that is of critical importance. Nevertheless, during the instructional design phase, certain media will be selected in deference to others according to an assessment of perceived potentials and limitations relative to the design of learning experience aimed at generating the desired outcomes of a particular educational program.

1. *Differentiating Educational Objectives*

There are numerous frameworks for considering the selection of media[47, 48] most of which tend to emphasize different types of educational objectives. Several taxonomies of educational objectives exist, with those developed originally by Bloom[49] and Gagne[50] among the most influential. Such frameworks, however, are much too detailed for present purposes. Nevertheless, it is important to provide some form of classification of objectives in which to consider the potentials and

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[47] Romiszowski, A., *The Selection and Use of Instructional Media: A Systems Approach*, London, Kogan Page, 1974.

[48] Reiser, R.A. and Gagne, R.M., *Selecting Media for Instruction*, New Jersey, Educational Technology Publications, 1984.

[49] Bloom, B.S., (ed.) *Taxonomy of Educational Objectives – Handbook I: Cognitive Domain*, London, Longmans Green, 1956.

[50] Gagne, R.M., *Essentials of Learning and Instruction*, Illinois, Dryden, 1956.

limitations of various instructional media. To this end, a basic distinction will be drawn between two main categories of objectives, based on the fundamental distinction between knowing that and knowing how.[51, 52] The two categories are objectives aimed at developing a conceptual knowledge base (concerned with knowing what) and objectives focused on intellectual skills (concerned with knowing how to do something). In turn, intellectual skills will be divided into knowledge domain-specific skills and domain-independent skills. For example, most vocational education is concerned with the development of a well-established body of knowledge (conceptual knowledge base) which lays the foundation for the development of particular intellectual skills (e.g. decision-making, applying procedures, solving problems) related to a specific knowledge domain. For instance, medical diagnosis is domain-specific in that it depends on a knowledge base consisting of an integrated set of medical concepts; similarly, technical diagnosis by a motor mechanic is dependent on a domain-specific conceptual knowledge base. The skills of the doctor and the motor mechanic are knowledge-domain specific. The diagnostic skills of the doctor do not make him or her a good mechanic. The reverse assertion is equally acceptable.

In addition to intellectual skills that are domain-specific, there exist more general skills which are potentially applicable to a wide range of knowledge domains. These general intellectual skills are employed when individuals are confronted by novel situations for which they lack any specialized knowledge base and associated domain-specific skills. For example, Newell and Simon[53] argued that means-ends analysis is very general in its applicability. Recent investigations of differences between experts and novices[54] have supported the view that domain-specific knowledge and skills are significant and somewhat neglected factors in problem solving and learning. Glaser and his co-workers concluded that "the problem-solving difficulties of novices can be attributed largely to the inadequacy of their knowledge bases and not to limitations in their processing capabilities. . . ".[55] The extent to which an educational program focuses on a particular domain-specific knowledge base and associated skills or on more general domain-independent intellectual skills, will, of course, vary just as the relative emphasis on knowing that and knowing how will vary. A major criticism of many

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[51] Anderson, J.R., *Language, Memory and Thought*, New Jersey, Erlbaum, 1981.

[52] Anderson, J.R., "Acquisition of Cognitive Skill," *Psychological Review*, 1982, No. 89, pp. 369–406.

[53] Newell, A. and Simon, H.A., *Human Problem Solving*, New Jersey, Prentice-Hall, 1972.

[54] Glaser, R., "Education and Thinking: The Role of Knowledge." *American Psychologist*, 1984, No. 39, pp. 93–104.

[55] Glaser, *Ibid.*, 1984.

educational programs is that too much emphasis is placed on the former and not enough on the latter. Part of the problem lies in the fact that intellectual skills are rarely taught explicitly. Consultation with an experienced instructional designer can help to redress this balance.

2. *Differentiating Types of Subject Matter*

Decisions about instructional media cannot be made solely on the basis of different types of educational objectives, though many popular schemes do exactly this, without giving due consideration to the type of subject matter to be addressed by a particular program of instruction. Classification of different types of subject matter can be particularly important in the context of distance education. The critical factor is the extent to which first-hand (direct) experience of specific equipment, particular environments or people is required to ensure the development of an effective knowledge base and associated intellectual skills. Some subject matter, such as mathematics, logic and language studies, consists entirely of what could be termed "symbolic reality". This reality is independent of time and place and can generally be presented to the learner without any problem at all. The subject matter which demands access to specific equipment, particular environments or the like (as for example in the teaching of land surveying) could be regarded as consisting of "tangible reality" that may be dependent on time and/or place and therefore be more difficult to bring to the learner. The extent to which direct experience of tangible reality is required by a particular body of knowledge is obviously a critical factor in assessing the applicability and likely efficacy of distance education. The need for direct experience of tangible reality may not, however, be critical at all stages of training. For example, if skills need only be developed to a basic level, there can presumably be little objection to the use of simulations involving models of reality, with opportunities to practice actual skill performance under authentic conditions being reserved for providing the finishing touch of skills already acquired at some level of mastery, and not for the learner's initial rudimentary efforts. Nevertheless, consideration of the extent to which various types of subject matter demand different degrees of direct experience with tangible, rather than symbolic reality, is an important factor in the selection of instructional media and therefore ultimately in determining the likely efficacy of distance education in a particular instructional context. Consideration of type of subject matter and the extent to which knowledge-base objectives or intellectual skill-based objectives are emphasized provides an appropriate framework for considering the potential and limitations of the major forms of instructional media (print-based, audiovisual and computer-based).

3. *Print-Based Instruction*

Print-based instruction, being independent of both time and place, tends to be the core medium for many distance education systems. If its potential is fully exploited through the use of concept mapping techniques, pictures, diagrams, self-assessment questions, assignments and an associated system for providing feedback, the print medium can be extremely powerful. Review of many instructional texts, however, suggests that print-based instruction is rarely exploited to the full. Further, despite its potential efficacy, written instruction has also got certain limitations in its treatment of certain types of subject matter.

In relation to the previous discussion of subject matters emanating from tangible and/or symbolic reality, the print-based medium suffers from the limitation that not all facets of reality can be captured in words or some other form of symbolic notation (mathematical notation, musical notation, etc.). Whereas the visual attributes of reality can readily be depicted verbally or through pictures, diagrams and the like, characteristics based on the senses of sound, smell, feeling and taste are more difficult. Such difficulties are not insurmountable, but do increase dependence on the prior experience of the student target population. A symbolic representation of reality in print will tend to conjure up images for students, but to be effective such images must be based on the prior direct experiences of students. The use of analogies based on the past experiences of students can to some extent circumvent this problem, but limitations exist. Similarly, the effectiveness of written instruction will depend significantly on the literacy of the student target population. The student's ability to decode and process symbolic information, including the capacity to interpret maps and diagrams, and the ability to answer self-assessment questions and assignments demands a certain proficiency in speech and writing. The criticality of the prior experience and level of literacy of the student is, of course, not limited to distance education, but is just as important in conventional face-to-face teaching.

The degree of importance of prior experience of tangible reality varies with the type of subject matter. In subjects dealing with the verbal-abstract nature of purely symbolic reality, such as Boolean algebra, written instruction has the potential to achieve both knowledge-based related objectives and intellectual skills-based objectives.

There is no reason to doubt that, in principle, the acquisition of both knowledge and skills in subject matter of an abstract symbolic nature can be achieved solely with carefully designed written instruction. Where intellectual skills acquisition depends on interaction with or manipulation of nonsymbolic aspects of reality, the print medium may tend to have limited application, although the judicious use of written instruction can still make a useful contribution. Further, especially with regard to domain-specific intellectual skills, it is often possible to clearly document explicit descriptions of decision-making/problem-solving strategies and procedures, which can be successfully incorporated into the text through careful elaboration. Such approaches can be supplemented by supplying the student with samples of tangible reality, for example, samples of engineering materials (c.f. Taylor and Evans[56]) which serve to enhance intellectual skills acquisition. Overall, where decision-making processes and/or problem-solving strategies can be explicitly documented (algorithmized), written instruction with an associated materials-mediated system of feedback may be adequate for the generation of intellectual skills. On the other hand, where problem-solving strategies are more general and open ended with a wider range of possible approaches (usually referred to as heuristics), a more personalized tutor-mediated feedback system is required. Further, in cases where manipulation of expensive and complex heavy equipment is required, as in the teaching of certain engineering subjects, students may ultimately have to be exposed to the equipment in order to gain the direct experience necessary for intellectual skills development. Where such skills also entail a psychomotor (e.g. manipulative) component, hands-on experience is likely to be even more critical. The demand for the development of such specialized expertise is usually to be found in specific knowledge domains in the field of vocational education.

The full exploitation of the print medium would appear to depend significantly on the productive interaction of both subject matter experts and an experienced instructional designer. Provided the student target population has achieved a sufficient degree of literacy, the print medium carefully designed to generate required learning experiences in an appropriate sequence would appear to offer a widely applicable teaching-learning resource that can be accessed at a pace suitable for each individual student. It is no accident that written instruction provides the core of the majority of distance education programs.

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[56] Taylor, J.C. and Evans, G., "The Architecture of Human Information Processing: Empirical Evidence," *Instructional Science*, 1985, No. 13, pp. 347–359.

4. *Computer-Based Instruction*

As mentioned previously, in settings where students have ready access to appropriate computer hardware, computer-based instruction can be independent of both time and place and therefore potentially useful for use in distance education applications. Despite its potential, computer-based instruction does not appear to be a major facet of many distance education systems. Lack of experience, high development costs and limited resources no doubt contribute to this state of affairs, though there exists at least one notable exception.[57]

From the pedagogical perspective, the potential contribution of computer-based instruction does not appear to be limited by the type of subject matter at least with objectives related to the development of conceptual knowledge bases. In the first instance, the computer can deliver text, but it is hardly likely to be worth the trouble or expense when compared to written instruction, which is ultimately more flexible from a student user point of view. The same potentialities and limitations of written instruction appear to apply to the computer for knowledge-base objectives, but it is in the potential for enhanced interaction relevant to the acquisition and refinement of intellectual skills that the computer comes into its own, since it can be programmed to simulate a range of both symbolic and tangible realities.

Students gain proficiency in intellectual skills by completing questions and assignments that require the student to practice the necessary decision-making/problem-solving operations. In cases where the strategies and procedures underlying such intellectual skills can be precisely and explicitly documented (algorithmized), computer-based instruction offers an excellent means of providing multiple opportunities for practising skills and gaining specific performance related feedback. In traditional face-to-face settings, such monitoring and correcting of intellectual skills performance of individual students can make excessive demands on the teacher, whereas well-developed computer-based courseware can be used effectively and efficiently to test the acquisition of the prerequisite knowledge base that ultimately enables application of intellectual skills.

Testing and reporting are integral features of educational programs, since it is essential that both learner and teacher are kept informed of progress made. The computer is by far the most efficient medium for the aforementioned testing of knowledge-base acquisition and intellectual skills that can be algorithmized. The testing function usually associated with the use of the term computer-managed learning, can fulfill an instructional function usually associated with computer-assisted learning as soon as feedback is provided to each phase of the execution of a skill. That a computer-based education system incorporating well-designed courseware can make a significant contribution to distance education (even simply in terms of reducing turnaround time on the provision of feedback) is without question. That such a system could make an equally significant contribution to traditional face-to-face teaching would appear to be also without question.

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[57] Barker, L.J., White, V.J. and Taylor, J.C., "Computer-Managed Learning in Tertiary Education: An Organizational Development Perspective," *Australian Journal of Adult Education*, 1985, Vol. 25, No. 1, pp. 23–30.

5. *Audiovisual Media*

Apart from broadcast radio and television, audiovisual media can be relatively free of time and place, provided students have ready access to audio and videocassette players. Further, if students have access to recording facilities, broadcast radio and television can become more or less independent of time and place, and therefore can constitute a relatively cost-effective means of distributing instruction. But what of their potential pedagogical efficacy? When all things are considered, audiovisual media do not appear to constitute a very useful general instructional means, except in a limited range of special cases.

With regard to purely auditory registration, apart from the specific domain of language instruction (in which speaking and listening skills are just as important as reading and writing), speech recordings barely afford pedagogical possibilities not already offered by print-based instruction. It is worth noting that sound recordings of a non-linguistic nature, such as bird calls, music produced by rare/archaic instruments or the like, can extend the possibilities of written instruction alone, but such cases will most likely be infrequent. Since what can be spoken can be written, it would seem that there is little to favor oral over written delivery of the same material in light of the inherent flexibility of the print-based medium. Accordingly, face-to-face lectures in traditional settings have been rightfully criticized. From a cost-effectiveness perspective, there appears to be a potentially strong case for replacing traditional on-campus lectures with well-structured written instruction designed to exploit the pedagogical potential of the print medium.

As for visual registration, while the addition of moving images will occasionally be required to enhance written instruction, the costs associated with the production and delivery of videotape usually mean that less expensive media are preferred. Moving images are most helpful in demonstrating experimental situations that entail the use of large, expensive or inaccessible equipment and in the demonstration of psychomotor (manipulative) skills, such as those involved in operating machines. In this latter context, a single practical demonstration can often outweigh extensive written instructions, especially in cases where students lack relevant direct experience.

There is no doubt that the addition of audiovisual media is essential in certain subject matter areas. Further, audiovisual media can no doubt add to the teaching of conceptual knowledge bases by providing images of examples of certain concepts. The teaching of knowledge-domain specific intellectual skills, especially those incorporating a psychomotor component, can probably be enhanced by the use of such media, but in the final analysis there is not much empirical evidence to back up such claims.[58] The use of audiovisual media in both traditional and distance education settings would appear to warrant careful analysis relative to particular instructional needs, since a small decrease in educative scope might well result in a large decrease in the costs of educational provision. At the same time, from a student perspective, it is likely that there is a certain virtue in using a variety of instructional media to satisfy individual preferences of students.

6. *Efficacy of Distance Education*

While distance education has the potential to make a significant contribution to virtually any educational program in most learning contexts (formal and non-formal), in light of such considerations as the type of education and relative maturity and sophistication of the student target population, it is probably safe to conclude that distance education may be best suited to vocational education aimed at the literate and numerate adult learner with relevant occupational experience. In this respect, distance education seems to be the most effective means of bringing about upgrading of domain-specific intellectual skills demanded by the introduction of new technologies in a wide range of occupations and professions, especially when such skills are of a purely symbolic nature. Where contact with tangible reality such as specific equipment is required, instructional materials need to be tailored to fit specific learning contexts, such that learning experiences can be planned to take advantage of the student target population's work environment. To illustrate the potential efficacy of distance education, a reasonably detailed example of basic instructional design decisions is presented in the area of banking education and training, which according to Camstra[59] tends to be somewhat conservative and traditional.

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[58] Chang, T.M., Crambag, H.F., van der Drift, K.D.J.M. and Moonen, J.M., *Distance Learning: On the Design of an Open University*, Boston, Kluwer-Nijhoff, 1983.

From a pragmatic perspective, it is assumed that print-based, audiovisual and computer-based instructional media are available in the learning context. Banking with its distributed network of branches spread over large geographical areas, often crossing international boundaries, would appear to be a prime candidate for training staff via the judicious use of distance education methodologies. Such a learning context would also appear to be blessed with experienced personnel, well-established communication systems (telex, telephone and facsimile), as well as sophisticated computer systems, which lay the foundation for an efficient student support system. The student target population of banking employees could be regarded as reasonably homogeneous, being literate and numerate, all having completed at least secondary education prior to being employed. These basic conditions appear to constitute an appropriate context for a successful distance education initiative.

Examination of training needs suggests that the banking population could be viewed as a "pyramid" consisting of a broad base of workers at relatively standard functional levels, and increasingly smaller groups the higher the functional level becomes.[60]

Different knowledge bases and associated intellectual skills are required to meet various functional requirements associated with job specifications at various levels. Such job specifications tend to be influenced by the spread of automation, which makes more or less continuous demands on staff for retraining. Thy pyramidal structure of the workforce is probably generalizable across other industries, but perhaps in retail banking the base of the pyramid is rather wider than in other training situations, since there tends to be a very large number of staff in direct contact with clients.

The tasks facing banking counter staff consist largely of applying well-established procedures to a myriad of transactions. For every banking operation at this level, there is a well-documented procedure, with its own standard form. Banking staff need to know what procedure is applicable to a particular transaction (which requires discrimination and classification) and the correct sequence of steps to follow in the execution of the procedure. The successful execution of such banking procedures requires that staff develop domain-specific intellectual skills. An important prerequisite to such intellectual skills development is the acquisition of a knowledge base consisting of various banking concepts, including credit and debit, currency exchange rates and many other concepts which enable counter staff to explain these basic banking operations to customers. Associated client counselling skills represent another significant training need for banking staff. Such skills demand the development of various affective capabilities, which are not totally intellectual in nature. From the point of view of type of subject matter, the development of counselling skills ultimately needs access to tangible reality in the form of people, whereas the aforementioned conceptual knowledge base and associated intellectual skills are largely concerned with symbolic subject matter and do not need access to equipment, except in the case of tasks demanding the use of calculators and computer terminals.

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[59] Camstra, B., "Computer-Based Education in Banking: A Conceptual Introduction," *Education and Computing*, No. 1, pp. 55–73.

[60] Camstra, *op cit.*, 1985.

Selecting appropriate instructional media to generate learning experiences capable of effectively satisfying the training needs identified above would mean that the acquisition of the conceptual knowledge base underlying an understanding of basic banking operations could be accomplished efficiently using written instruction entailing concept mapping techniques and associated self-assessment questions. Acquisition of the intellectual skills based on selecting and applying appropriate banking procedures could also be achieved primarily by well-designed written instruction, though the large number of factors influencing both decision-making and the execution of subsequent procedures (all of which having the potential for detailed analysis and documentation) suggests that a strong case would exist for the development of a computer-based learning system. For example, an instructional design analysis of a bank officer's job,[61] demonstrated the need to be able to make exactly 80 different decisions, taking into account 53 factors and 109 combinations of these factors. Intelligent job-aids developed to support trainees in such a complex decision-making context "eliminated up to six months of conventional on-the-job training and put novices to work after approximately a 30-minute explanation of how to follow the algorithm and make decisions based on it".[62] Such a detailed analysis of banking operations could lay the foundation for the development of a computer-based learning environment in which trainees were able to develop the necessary competencies through performing exercises entailing the selection of an appropriate procedure for a given set of circumstances, and the identification, ordering and execution of steps constituting the selected procedure. Comprehensive instruction in all possible combinations of decisions and factors with appropriate performance related feedback could result in voluminous print-based instructional materials, whereas the storage and information processing capabilities of the computer and the algorithmic nature of the required intellectual skills could provide the basis for an effective computer-based training system. Such a system could be particularly beneficial in allowing trainees to practice all aspects of procedures in simulated cases, without having an actual client as a potential victim of inefficiency. Such an approach could also lay the foundation for the development of an expert system for diagnosing various circumstances in order to select the appropriate procedure. This could be especially important when the frequency of occurrence of certain transactions is low, with the result that staff are liable to have forgotten the appropriate intellectual skills through lack of opportunity for regular practice. Equally, the expert system could document precisely the necessary "diagnostic" decision-making sequence and associated procedures. Such a computerized system could be used both for initial training and be accessed as a ready source of reference on the job when required.

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[61] Landa, L.N., "The Improvement of Instruction, Learning and Performance", *Educational Technology*, 1982, Vol. 22, No. 10, pp. 7–12.

[62] Landa, *Ibid.*, 1982.

The training of the conceptual and intellectual components of client counselling skills could be achieved through written instruction, but the actual performance of such communication skills (maintaining eye contact, etc.) ultimately requires face-to-face contact with people. Training approaches based on role-playing with video feedback would ideally be required to meet this need. An alternative more cost-effective approach, however, would be to endeavor to select trainees on the basis of well-established interpersonal communication skills as well as academic criteria, since the cost-benefit of developing such skills might tend to entail high cost and minimal benefits.

An important point emerges from this brief exemplification of the selection of instructional media, the same instructional design decisions could apply to conventional educational programs conducted in face-to-face settings as to the distance education context. The conclusion reached would not necessarily support an emphasis on face-to-face teaching. The potential cost benefits of instructional design which lead to the development of multimedia learning packages are not limited to distance education initiatives, but due largely to the outmoded traditions of conventional face-to-face education and training, many students are not likely to gain access to such benefits. What is really needed is a switch from an emphasis on instructional delivery by individual teachers/trainers which tends to dominate conventional education and training systems to an emphasis on instructional design and development of multimedia learning experiences by a multidisciplinary team of experts, which could virtually guarantee and could certainly enhance effective student performance of a wide range of intellectual skills in a wide range of subject matter areas. The important question is that of the degree to which conventional face-to-face education in both formal and non-formal educational settings can be efficiently replaced by distance education initiatives, which appear to have the potential to generate effective educational outcomes in an extensive range of subject matter areas. Further, the use of multimedia self-instructional packages in conventional primary and secondary education could well pave the way for involvement in distance education at a later stage with the likely facilitation of a widespread commitment to genuine lifelong learning.

PERSPECTIVES ON IMPLEMENTING COST-EFFECTIVE DISTANCE EDUCATION

A. Instructional Materials Development Infrastructure

The aim of all distance education operations must be to provide effective instruction at the lowest possible cost. The production of effective instructional materials tends to depend on a somewhat unusual economic structure reflecting lopsided investment requirements characterized by: high development costs and relatively low delivery and implementation costs. The majority of costs is incurred prior to any student being exposed to the educational process embedded in the materials. Further, in the final analysis, cost-effectiveness is highly dependent on the number of successful students. In turn, the number of successful students will be highly dependent on the quality of instructional materials. What is required is a sophisticated infrastructure comprising a professional multidisciplinary team of experts, working with adequate facilities and equipment according to appropriate timeliness. This infrastructure requires a range of expertise to support the instructional design, development and production functions across a range of media. Ideally, the infrastructure should support the development of print-based, audio-based, video-based and computer-based instructional materials as outlined in the following diagram (Figure 1).

It is apparent that a major investment is required in personnel, facilities and equipment to support such a sophisticated infrastructure. Apart from expert personnel, a word processing system and printery are required to support the production of written materials; audiovisual studios and equipment are required to support the production of audio and videocassettes; and major investments in hardware and software are required to support computer-based instructional initiatives.

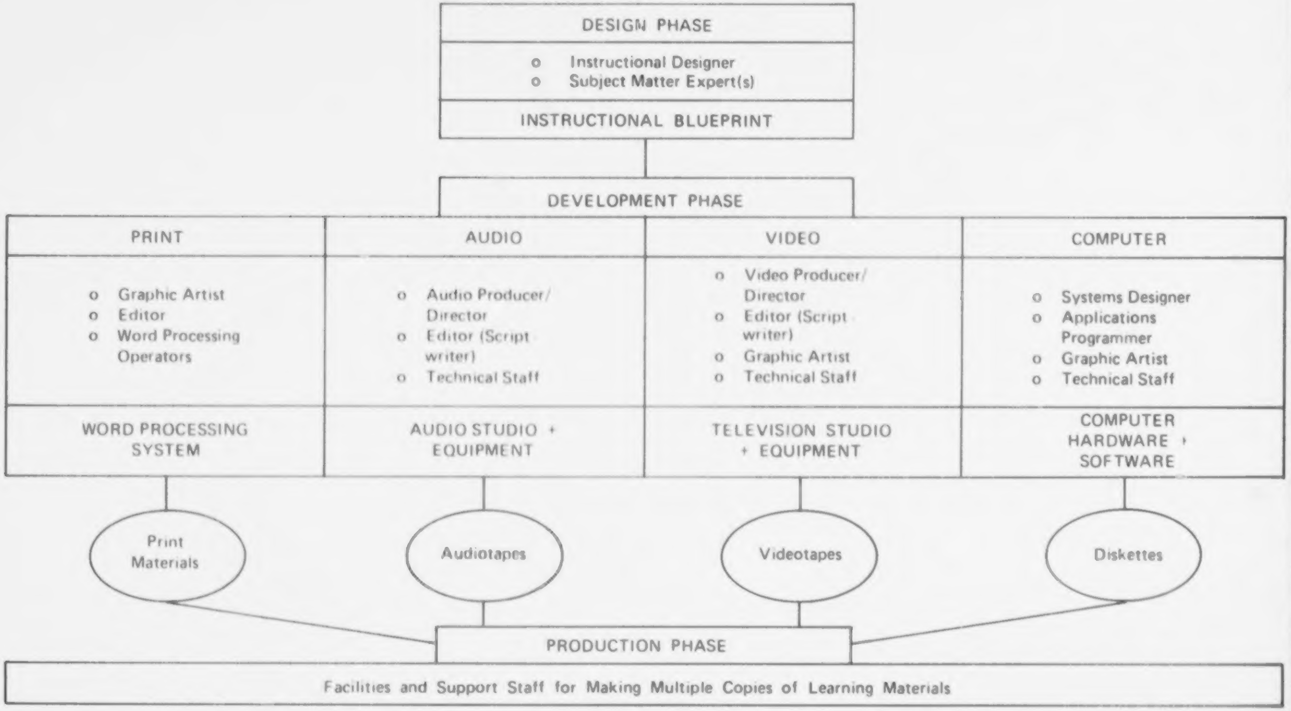
In the design phase of the process, the instructional designer works with the subject matter expert(s) to formulate a blueprint for instructional development and delivery in much the same way that an architect provides a blueprint for a building, which is subsequently constructed according to required specifications. This design phase entails a systematic, fine-grained analysis of the learning experiences required for the development of necessary knowledge and intellectual skills that constitute the desired outcomes of the instructional program. The amount of time required for this phase will, of course, depend on the complexity of the learning task and on the range of media required. Application of such a systematic instructional design process will determine the required media mix for each project and thereby the necessity of involving various other media specialists in the development phase. Obviously, such decisions cannot be made solely on pedagogical grounds, but will have to consider pragmatic constraints on the range of instructional media to which students in the target group have ready access. This design phase will obviously be enhanced if the best subject matter experts, preferably those with a sympathetic interest in student progress and teaching, can be made available.

Once the instructional requirements of a project have been delineated, the development phase can be initiated in light of the specifications and timeliness determined during the design phase. If a range of media is to be used, the development phase can be quite complex, demanding a careful orchestration of a variety of inputs from experts in audiovisual production, editorial scriptwriting, graphic arts, systems design and computer programming. In most instances, the instructional designer whose expertise includes matching media with learning requirements, is the best person to act as project leader, though at various stages the audiovisual expert or computer specialist will need to assume executive responsibility for certain aspects of instructional materials development. Similarly, the subject matter expert must have the final say on matters of academic content. The multidisciplinary team approach then is by no means simple and requires good interpersonal techniques by the project leader.

Once the original instructional package is developed, various categories of production staff must be called upon to make multiple copies for delivery to students. A range of specialized equipment is required at this phase of the process. Facilities will be required for printing written materials, making multiple copies of audio and videocassettes and computer diskettes.

It is apparent that the costs associated with the establishment of such an infrastructure are likely to be beyond many institutions in the formal educational arena, and most certainly beyond many organizations involved with non-formal education. Nevertheless, one of the

Figure 1: INSTRUCTIONAL MATERIALS DESIGN DEVELOPMENT AND PRODUCTION INFRASTRUCTURE


DESIGN PHASE
o Instructional Designer
o Subject Matter Expert(s)
INSTRUCTIONAL BLUEPRINT
DEVELOPMENT PHASE
PRINT
AUDIO
VIDEO
COMPUTER
o Graphic Artist
o Editor
o Word Processing Operators
o Audio Producer/ Director
o Editor (Script writer)
o Technical Staff
o Video Producer/ Director
o Editor (Script writer)
o Graphic Artist
o Technical Staff
o Systems Designer
o Applications Programmer
o Graphic Artist
o Technical Staff
WORD PROCESSING SYSTEM
AUDIO STUDIO + EQUIPMENT
TELEVISION STUDIO + EQUIPMENT
COMPUTER HARDWARE + SOFTWARE
Print Materials
Audiotapes
Videotapes
Diskettes
PRODUCTION PHASE
Facilities and Support Staff for Making Multiple Copies of Learning Materials

attractive features of modern distance education is that it frees instruction from time and place through the generation of relatively permanent instructional resources (print materials, audiotapes, videotapes, computer-managed learning packages, etc.). The availability of such teaching resources can contribute to economies of scale, reducing per student costs as the number of students using these resources increase. Since the costs associated with the development of instructional resources are fixed, the incremental cost of delivery to an increasing number of students can be relatively small.

Many distance teaching institutions service relatively small numbers of students in each course and operate with limited budgets. To enhance course delivery, the acquisition of teaching resources produced elsewhere at less cost than original production must be an attractive proposition. Similarly, institutions with major investments in specialized development and production infrastructures (e.g. instructional design, audiovisual media, computer-based instruction) could also benefit from the sale of teaching resources to other institutions, benefiting through the amortization of development costs.

Despite the logical appeal of sharing distance teaching resources, apart from the Open College in Macau, which uses distance learning materials from the United Kingdom, Australia and New Zealand, there is little evidence of extensive cooperation at this level in the distance education arena. Faced with numerous perceived constraints, institutions and organizations have tended to follow the traditional path of local development of teaching resources. There is an apparent need for the development of a model to facilitate active collaboration in the cooperative development and use of teaching resources. Such a model for collaboration could well make a significant contribution to the efficiency and effectiveness of distance education in the region.

B. Potential for Active Collaboration

Active collaboration between operators of distance education systems has the potential to make a significant contribution to cost-effectiveness through the optimization of economies of scale. While there is little scope to achieve economies of scale in the processes of student assessment or system evaluation, there is some scope for the improvement of efficiency in the area of student support. For example, the use of study center facilities by an increased number of students might well be possible without any significant rise in operational costs. By far, the greatest scope for achieving economies of scale, however, lies in the cooperative design, development, production and use of instructional materials.[63] Such a quest for increased efficiency could entail:

(i) eliminating unnecessary overlap in the production of courses;
(ii) concentrating more students in any given course;
(iii) maximizing the use of existing, sophisticated instructional materials design, development and production infrastructures; and
(iv) creating a centralized curriculum and instructional materials development and production facility.

A combination of such initiatives would lead to greater cost-effectiveness since the cost per student unit could be reduced, while the total resources and effort dedicated to the achievement of instructional quality could be increased. If this potential for improved cost-effectiveness is to be realized, however, a number of constraints have to be overcome.

C. Constraints

Apart from possible language differences,[64] barriers to genuine collaboration in the development and use of distance teaching resources emanate primarily from the strongly entrenched tradition of academic freedom. The traditional autonomy of the individual teacher, particularly in tertiary education, has promoted somewhat personalized approaches to curriculum design and instructional design. This freedom to give a personal slant to teaching is jealously guarded by many academics. Such autonomy is a major constraint to cooperation, since it is manifested, for example, in the selection of prescribed textbooks for units of study. A recent major review conducted under the auspices of the Australian Council of Directors and Principals of Colleges of Advanced Education (ACDP), demonstrated a minimal overlap in the use of prescribed textbooks for apparently compatible units of study. For example, 24 different textbooks were used for the foundation unit for undergraduates in this field.

The picture is even more complicated in distance education. Since a permanent record of the instructional process is captured in print or some form of electronic media, it is not unusual for instruction to incorporate references to specific system characteristics which may be peculiar to a particular institution. For example, some institutions make extensive use of telephone tutorials, reference to which is embedded in the instructional materials. This problem of the "institutionalization" of instructional materials is further reflected in the extent to which specific institutions make various degrees of use of a whole range of distance education methodologies including residential schools, computer-managed learning, local tutors and so on. This tendency towards institutional insularity further particularizes distance education materials. Localized development of instructional materials is often further complicated by references to regional or national examples, which may only be meaningful to a specific ("local") target group. Obviously, materials designed for cooperative use need to: address a wider target audience, illustrate points with a wide range of examples and minimize instruction-specific administrative jargon referring to particular system capabilities. In effect, instructional materials designed to be used in a wide range of contexts would need to concentrate on substantive subject matter and be essentially system free or "de-institutionalized".

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[63] Johnson, 1986.

[64] Calvert, J., *Facilitating Transfer of Distance Courses*, Paper presented at the 13th World Conference of the International Council for Distance Education, Melbourne, 1985.

This line of argument does not deny that genuine differences in curricular requirements are likely to exist between institutions. The particular emphasis given to topics within a unit of study is bound to vary from institution to institution, and is likely to be further complicated by different course structures. Nevertheless, it seems reasonable to argue that the essential core of many subject matter areas will likely consist of similar topics treating the key concepts of a discipline, especially at the foundation level. Recent developments in concept mapping and related techniques (e.g. Novak and Gowin,[65] Taylor and Evans [66]) suggest that the benefits associated with the careful analysis of the structure of subject matter (demanded by detailed comparisons of curricula) can, with related instructional design techniques, enhance the efficiency of student learning. In short, if approached at the topic level, detailed analysis of different curriculum requirements is likely to demonstrate that such differences do not constitute a major obstacle to collaboration in the cooperative development and use of distance teaching resources in many instances.

Apart from these constraints which stem largely from academic freedom and institutional insularity, certain pragmatic constraints also exist. Such pragmatic constraints include copyright requirements, adaptation and ownership issues, as well as pricing policies and associated funding allocations.[67] Copyright clearance and associated charges tend to vary significantly according to whether an institution stands to profit from the sale of educational materials. Thus, associated costs may differ for government-sponsored students and private students. The issue is further complicated by the fact that copyright regulations vary from country to country, making cooperation on an international level potentially more problematic. If, however, materials are being developed from scratch with international usage in mind, copyright issues can be dealt with effectively during the design and development phases of instructional materials production.

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[65] Novak, J.D. and Gowin, D.B., *Learning How to Learn*, New York, Cambridge University Press, 1982.

[66] Taylor, J.C. and Evans, G., "The Architecture of Human Information Processing: Empirical Evidence," *Institutional Science*, 1985, No. 13, pp. 347–389.

Associated with concerns about copyright is the question of ownership of the instructional materials and the extent to which the design and development teams should receive royalties from sales. Distance education institutions and organizations are likely to have different policies on such matters. There is an evident need for a clearly defined policy on ownership, as there is in questions on the extent to which materials might need to be adapted for a particular instructional context and the related issue of the extent to which major changes might lead to claims on ownership of materials. Such claims are likely to be further complicated by the pricing policy on sale and purchase of materials relative to student fees, government grants, funding allocation within institutions and so on.

Such potential pragmatic constraints are certainly real and relatively complex, but they are not insurmountable. Like the aforementioned academic constraints, all the foregoing difficulties and obstacles as Johnson[68] has pointed out, are basically questions of attitude and policy and, therefore, can be changed. What is required is a commitment to cooperation, a resolution in favor of active collaboration, and the generation of strategies for overcoming such perceived constraints.

D. Strategies

Strategies for overcoming constraints to the cooperative development and use of distance teaching resources can be seen to be dependent on various levels of cooperation. Such cooperation could entail:

(i) sharing existing teaching resources;

(ii) adapting existing teaching resources;

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[67] Calvert, *op. cit.*, 1985.

[68] Johnson, *op. cit.*, 1986.

(iii) sharing expertise in the design phase of instructional materials production; and

(iv) sharing expertise and facilities in all phases of instructional materials production.

The first two levels of cooperation incur curricular considerations, since there must exist a sufficient degree of overlap between course offerings for such cooperation to be viable. The latter two levels of cooperation, however, do not invoke issues of curriculum design and should therefore be easier to engender. These latter two levels of cooperation are already in operation in Australia. For instance, within the same state, two colleges of advanced education have signed a contractual agreement whereby the instructional design specialists of one college provide advice to subject matter experts of the other college on the design of instructional materials. This model has also been used in cooperative arrangements between a college of advanced education and a number of major industrial organizations.

In a more extensive collaborative effort, an Australian college of advanced education in Queensland has signed a contractual agreement with a similar college in New South Wales which was embarking on a distance education initiative for the first time. The contract entailed payment for the design, development and instructional materials production of two undergraduate courses: Bachelor of Applied Science (Environmental Health) and Bachelor of Applied Science (Land Economy). This latter arrangement which, in effect, makes use of an existing distance education infrastructure, makes a great deal of economic sense, since the recipient college avoided the major capital investments required to establish the necessary infrastructure. This arrangement is now in its third year of operation and initial evaluation of the project[69] is encouraging.

Both the aforementioned infrastructure sharing models of cooperation have certain advantages as they effectively avoid questions of curricular compatibility and issues emanating from academic freedom and institutional insularity, since the materials were designed from scratch for a specific target audience in a particular instructional context. Further, pragmatic issues concerned with ownership were determined prior to the contracts being signed, while such issues as copyright were taken into account during the design and development phase of the courseware production. The cooperative use of a well-established infrastructure of instructional designers, editors, graphic artists, audiovisual facilities, printing and mailing facilities, appears to offer one viable strategy for active collaboration in instructional materials production for distance education.

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[69] Kemp, J.E., *Designing Distance Education Courseware at a Distance*, Paper presented at 13th World Conference of the International Council for Distance Education, Melbourne, 1985.

Such a strategy has certain limitations, however, since it does not tap the potential for increased cost-effectiveness that can be achieved through eliminating unnecessary overlap in the production of courses and thereby increasing the number of students enrolled in any given course. Such initiatives demand collaboration at the curriculum level, which inevitably raises issues associated with academic freedom and institutional insularity, and thereby becomes a much tougher proposition. Let it be emphasized again that such collaboration is not insurmountable. As mentioned earlier, it is largely a matter of attitude and policy, unlike collaboration based on infrastructure sharing, which amounts largely to a matter of economic common sense. A more comprehensive attitude change strategy is required for collaboration demanding curricular compatibility.

Attitudes are notoriously difficult to change. It therefore seems likely that, unless government funding sanctions are imposed, collaboration entailing curricular compatibility is likely to be resisted. Even then, without willing parties, the quality of the outcomes of such "cooperation" is likely to be somewhat suspect, and more likely, the process of achieving outcomes will be extremely attenuated and therefore less than cost-effective. A more reasonable approach would be to seek willing participants in such a cooperative enterprise through, for example, the formation of teaching resources consortia on a voluntary basis in particular discipline areas. Each participating institution/organization could contribute funds to the project (although there is an obvious role for the Bank in the provision of seed money at this juncture). Starting with a conference focusing on curriculum design issues, working groups could be established in specialized areas to document the structure of the subject matter under the guidance of suitably experienced instructional design experts. Such a conference could initiate the design and development phases of instructional materials production that could ultimately use an existing well-established infrastructure. At the same time, a team of management and legal specialists could be charged with the task of delineating ownership and pricing policies and associated issues to engender a workable model of collaboration. Once guidelines had been established, it would surely be a relatively straightforward matter to extend such a process to other discipline areas. The selection of appropriate trial projects should be sufficiently complex and overarching to be a true test of the likely ongoing success of such initiatives. It is this selection of potential trial projects upon which attention is next focused.

E. Potential Collaborative Projects

Any project selected to test the viability of active collaboration in instructional materials design, development, production and subsequent use, must have the potential to satisfy existing human resource development needs within the region. Further, such projects should also entail the need to cope with problems associated with curricular compatibility, which would make a more severe demand on cooperative efforts than trials based only on the infrastructure model, though at least one trial project entailing only the latter could be worthwhile, since the timeliness and associated costs would be of lesser magnitude. A comprehensive test of the potential for active collaboration would also need to cover the primary, secondary, tertiary and continuing professional education sectors of formal education, and the vocational and personal development sectors of non-formal education. What appears to be required then is a series of trial projects.

Science education and mathematics education are prime targets for both the primary and secondary education sectors of formal education. A great deal of curriculum design work has already been done in these areas. The production of learning materials based on self-instructional principles for such subjects could make a significant contribution, since much curriculum work stops short of producing a wide range of teaching resources. The availability of such quality materials could standardize the quality of teaching in remote parts of the region, and could support the role of paraprofessional barefoot teachers. Such materials could also make a contribution to in-service teacher education, since they could be used as examples embodying various teaching methodologies and curriculum design models in courses for teacher upgrading such as the Bachelor of Education degree. Such an initiative could lead to a series of coordinated trials covering all three major sectors of the formal education spectrum. Other projects which might also be suitable contenders in the arena of formal education include teaching English as a second language, literacy, numeracy, engineering and health education.

In the non-formal educational sphere, a project in professional education could be based on computer education which, like the aforementioned formal education projects, could well be considered to be a universal educational need. Such a project could focus initially on computer awareness and then develop a series of modules for a number of professions aimed at developing a knowledge base and associated intellectual skills in the use of existing software packages such as dBase II, Open Access, Lotus and the like. The private sector already markets multimedia packages in such fields, but costs are usually high for hardware, software and associated training courseware, which is not always designed to operate on self-instructional distance education methodologies. A related, relatively universal need, though with a much smaller potential target audience, is the actual training of computer programmers and systems analysts. This suggested computer-based project could of course be extended to cover needs in personal development in non-formal education, or indeed could become the focus of a project for the formal education sector since, as Sharma[70] has pointed out, there cannot be a clear dichotomy between formal and non-formal education. Such a project would have the added complexity of having to standardize on a limited range of particular hardware and software. In the field of professional education in the non-formal education sector, a number of further possible examples of "universal" needs exist in such fields as management education, international law and international marketing.

In keeping with the earlier emphasis on non-formal vocational education, there follows a reasonably extensive discussion of potential trial projects in this field, where the potential for collaboration is somewhat limited by competition in the commercial arena. Vocational education in the non-formal education sector exists in a somewhat more complex environment, since the need to gain an efficiency advantage over competitors in the same field seems likely to delimit potential cooperation in education and training. Many large firms and corporations with personnel distributed over a wide geographical area, could no doubt benefit from the adoption of distance education techniques for the purpose of human resource development. A reasonably detailed discussion of benefits is available in the description of one Australian corporation's experience in replacing a centralized face-to-face training system for technical sales representatives in the field of water engineering with a training system based on distance education methodologies.[71] This corporation, however, took various steps to protect its investment in distance education from its competitors, even though the instructional materials produced were largely "corporation-specific".

While the potential for increasing access to educational opportunities is, of course, a major attraction of distance learning approaches, Foggo[72] drew attention to the basic difference between the aims of learning in the academic field and in industry and commerce, when discussing the aforementioned ICI/Open Tech project. In his view, success of such initiatives should be judged, not by the amount of instructional materials produced, nor by the number of people using the materials, nor by the levels of mastery demonstrated, but ultimately by the extent to which the business has benefited from the work as manifested by improved operating standards and reduced operating costs. The judgment of success according to such strict criteria again emphasizes the central role of the need for efficacious high quality instructional materials. It is therefore somewhat surprising that Foggo did not place more emphasis on the costs associated with instructional materials development relative to the investment of some three million pounds in his company's pilot project, since the development of all instructional materials and especially some types of video-based courseware and computer-based courseware can be relatively expensive.

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[70] Sharma, M., *Distance Education*. Professional Staff Paper, Manila, Asian Development Bank, 1985.

[71] Oldfield, D. and Taylor, J.C., "Industrial Training and Distance Education." *International Council for Distance Education Bulletin*, 1984, No. 6, pp. 58–64.

[72] Foggo, *op. cit.*, 1985.

While major cost savings could be effected by appropriate collaboration, competition between industrial and commercial corporations seems likely to limit such initiatives, especially where commercially sensitive topics are involved. Further, the likely need for "corporation-specific" courseware would further delimit the prospects of genuine collaboration. Nevertheless, from a cost effectiveness perspective, use of an existing instructional materials design, development and production infrastructure, or some part thereof, could prove beneficial. For example, in the aforementioned Australian example, the corporation contracted only for specialist instructional design input since it had already developed its own production infrastructure for print-based and video-based materials.

Moving towards a more general perspective on the interface between distance education as a mode of instruction and vocational education, many corporations can be viewed as consisting of a pyramid of a broad base of workers at relatively low functional levels, and increasingly smaller groups of workers the higher the functional level becomes. Different sets of knowledge and skills are required at various functional levels, and staff promoted from lower functional levels to fulfill more specialized roles often require retraining on the job. Further, many industrial and commercial corporations are faced with stringent economic constraints, which often lead to changes in organizational structures that ultimately demand that fewer people cover wider areas and subsequently require a broader range of knowl[illegible] and skills. Increased automation tends to add further to the needs [illegible]or retraining staff. Industrial and commercial corporations must therefore increasingly take responsibility for human resource development, especially in fields of endeavor that are "corporation-specific". Distance education as a mode of instruction appears to have much to offer, since multimedia based self-instructional packages can meet individual needs by allowing flexibility of the pacing and timing of learning opportunities. Consistent quality of instruction can be delivered to individuals whenever circumstances in the workplace demand. Such flexibility appears to be worthy of pursuit.

There is obvious scope for the application of distance education as a mode of instruction in vocational education. Apart from quite large corporations, however, it is unlikely that many organizations will have the resources to devote to the establishment of the infrastructure required to support such an initiative. This is especially the case for small businesses employing perhaps 100 people. Corporations with personnel distributed over large geographical areas still have to meet training needs, ideally with minimal disruption to commercial activities. The production of appropriate self-instructional learning materials can service the needs of both large and small businesses. There appears to be a need for some sort of centralized agency which could assist such organizations to produce necessary learning materials on a fee for service basis. Such centralization would have the benefit of concentrating instructional design and development expertise in such a way that a wide range of organizations could gain access to the infrastructure necessary to produce efficacious instructional materials. While the scope for collaboration is somewhat limited by competitive commercial interests, a series of trial projects in the field of vocational education based on giving organizations access to an instructional materials production infrastructure, possibly based on existing facilities, appears to be worthy of consideration. The identification of potential projects worthy of the Bank's closer consideration for involvement is next considered.

F. Specific Areas for Bank's Involvement

Given the scope for collaboration in distance education applications, the Bank could usefully become involved in a range of activities aimed at making the best use of available self-instructional resources. In the first instance, the Bank could endeavor to establish a working group to document a database of existing distance education applications in the Asia-Pacific region. This database should delineate not only courses, but also teaching resources such as correspondence materials, audiotapes, videotapes and so on. The Bank could then establish a series of Regional or National Clearing Houses for such materials, by gathering sample materials so that an assessment of their potential use in a variety of settings in different countries could be established. This type of initiative would help prevent the "reinvention of the wheel" and hopefully make the best use of the already extensive bank of existing instructional materials.

The proposed working groups could be composed of representatives from each of the developing member countries. Initial data collection on course offerings could take place by means of questionnaires. Similarly, collection of sample materials could be achieved without excessive financial commitments, though space would be required for storage and an appropriate inventory system would need to be established to support the proposed Clearing House concept. The Bank could then finance a coordinated series of workshops aimed at identifying instructional materials from the samples collected that were appropriate for use in a wider range of settings than those in which they were currently being used. The identification of the extent of required adaptations of existing materials, including translation into different languages, could be addressed during such workshops.

A related series of workshops could be organized to clearly document needs for new or updated instructional materials. Again, a working group could be established to coordinate a series of national and/or international meetings with each developing member country being represented. The group could document the curricular and instructional materials needs in terms of particular subject matter areas and viable instructional media. The involvement of at least one experienced instructional designer would be useful to help document subject matter structures and associated instructional objectives. It would also seem appropriate to involve representatives from industry, commerce, and relevant community groups as well as representatives from the formal education sector. Obviously, not every subject matter area could be represented at such meetings but some specific areas of apparent need are suggested below.

In the field of agriculture, for example, the growth of knowledge and technology has the potential to create more efficient systems of animal and crop production. In particular, developments in selecting appropriate varieties of crop for particular climatic and soil conditions, associated irrigation and fertilization decisions, and disease control techniques seem to offer suitable targets for distance education applications. Associated courses could be developed in the areas of farm management, the mechanization of agriculture and associated maintenance of agricultural machinery. Further, in more mountainous terrain the issues of water erosion, soil conservation and the use of trees for land stabilization could provide fruitful foci for distance education initiatives.

In many areas of the region, there is a need to increase the supply of trained engineers at a variety of levels. Were the Bank to operationalize the proposed Clearing House initiative, it would attract an extensive range of existing instructional materials covering numerous aspects of civil engineering, surveying, electrical (including electronics) and mechanical engineering, all of which are based on scientific principles. Such materials would provide an excellent resource for the proposed working group meetings of relevant experts from the developing member countries.

Increasing the efficiency of business operations would appear to provide another appropriate focus for the Bank's involvement through the funding of the aforementioned working groups. Particular concerns in this field would tend to center on such areas as accountancy, marketing, information systems and computing, as well as management education and office automation. The scope for the use and/or adaptation of existing materials in this field is probably extensive, since several institutions in the region have already developed a significant amount of instructional material to support external Bachelor of Business degrees. Such materials form a valuable resource, which could be adapted to meet the needs of other tertiary institutions wishing to embark on business education and/or the needs of corporations, wishing to upgrade in-house training. It may be necessary to adapt such materials to cater for the specific needs of particular industries, so that instructional materials would be developed to satisfy the education and training requirements of, for example, the textile industry, the banking industry, the transport industry and so on. The scope of the proposed working groups' efforts could also encompass the development of instructional materials for use in secondary or even primary schools, so that the total spectrum of educational endeavors could be coordinated in the interests of national and regional development.

Such initiatives highlight the critical role of teacher education both pre-service and in-service. The Bank could obviously support initiatives in this area to strengthen the essential underpinnings upon which the ultimate success of education and training is so dependent. The scope for international cooperation in such areas as mathematics education, science education, language teaching, basic health and hygiene studies, computer literacy and technology studies, appears to be extensive. Again, a great deal of effort has already been expended in many developing member countries in the field of (in-service) teacher education. Nevertheless, there is still a great deal more to be done.

It is worth noting at this point that a recent World Bank report, "Financing Education in Developing Countries",[73] concluded that many developing countries are spending too much on higher education at the expense of primary education. The authors of the report argued that despite the declining justification for tuition-free higher education, many countries have retained it because governments often respond to the demands of articulate socioeconomic groups for increases in public funding of higher education by diverting resources from more socially profitable levels of education. It is noted, for example, that if the Government of Malawi required university students to pay full cost recovery fees, the country could increase spending on primary education by 54.4 per cent. The report also recommends encouragement of private sector involvement in tertiary education, including the launching of student loan schemes, to support a switch in emphasis towards the achievement of universal primary education. This report serves to emphasize. the aforementioned critical role of teacher education in achieving national development. The significant potential of distance education in this field should not be overlooked by the Bank.

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[73] Psacharopoulus, G., Jimines, E. and Tan, J.P., *Financing Education in Developing Countries*, Washington D.C., The World Bank, 1986.

In summary, these initiatives could lead to the following possible activities in which the Bank might become involved:

- establishing and maintaining a distance education database, delineating course offerings and instructional materials;
- establishing a resource collection of instructional materials;
- establishing associated Regional or National Clearing House operations;
- conducting a series of national and/or international workshops to assess the potential utility of existing instructional materials in a variety of educational contexts;
- promoting the cooperative use of existing instructional materials through seminars and orientation courses; and
- conducting a series of national and/or international workshops to delineate curricular and instructional needs in particular subject matter/vocational areas, such as:

    - agriculture
    - engineering
    - teacher education
    - business education
    - science education
    - mathematics education
    - health education

- facilitating cooperative development and use of instructional materials;

- translating new and revised instructional materials into local languages of participating countries;
- conducting a series of trial projects to evaluate the applicability and wider use of instructional materials;
- collaborating with educational institutions, government agencies, business organizations and international aid agencies to provide support services for distance education initiatives;
- promoting the use of distance education as a mode of instruction in industrial and commercial organizations;
- training teams of instructional designers and subject matter experts to develop self-instructional materials using a range of media;
- training media personnel regarding their involvement in distance education;
- disseminating exemplary instructional materials, evaluation instruments, research reports, etc.; and
- promoting research and evaluation studies on distance education.

Overall, the potential for a series of specific distance education initiatives in a wide range of both formal and non-formal education settings appears to offer the Bank extensive scope for involvement. The question then arises as to how best to stimulate such developments. It is here that the Bank might have a further significant catalytic role to play.

CONCLUSION

A. A Distance Education Center for the Asia-Pacific Region

It appears that distance education has the potential to make a significant contribution to the quality and extent of educational opportunities in a wide range of both formal and non-formal educational settings. Indeed, distance education seems to offer the opportunity "to further the Bank's objectives of developing human resources and the technical managerial competencies in its developing member countries . . .".[74] The encouragement of distance education initiatives will not be successful, however, without careful planning and the commitment of sufficient human and material resources to ensure the production of learning materials of the highest quality. In the first instance, planning will demand the judicious selection of a number of projects worthy of support from the many aforementioned potential applications, and the availability of sophisticated design, development and production infrastructure.

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[74] Sharma, M., *Distance Education*, Professional Staff Paper, Manila, Asian Development Bank, 1985.

While one alternative would be for the Bank to commission a series of coordinated projects managed by and through institutions with the necessary sophisticated infrastructure already in place, a bolder initiative could lead to the Bank taking steps to engender the establishment of a Distance Education Center in the Asia-Pacific (DECAP). Such a center could become the hub for a concerted effort to promote cost-effective distance education programs of the highest quality. The centralization of such activities would presumably enhance the prospects of genuine collaboration, since development would be coordinated to avoid overlap in courseware development and a central database of instructional resources could be developed and maintained.

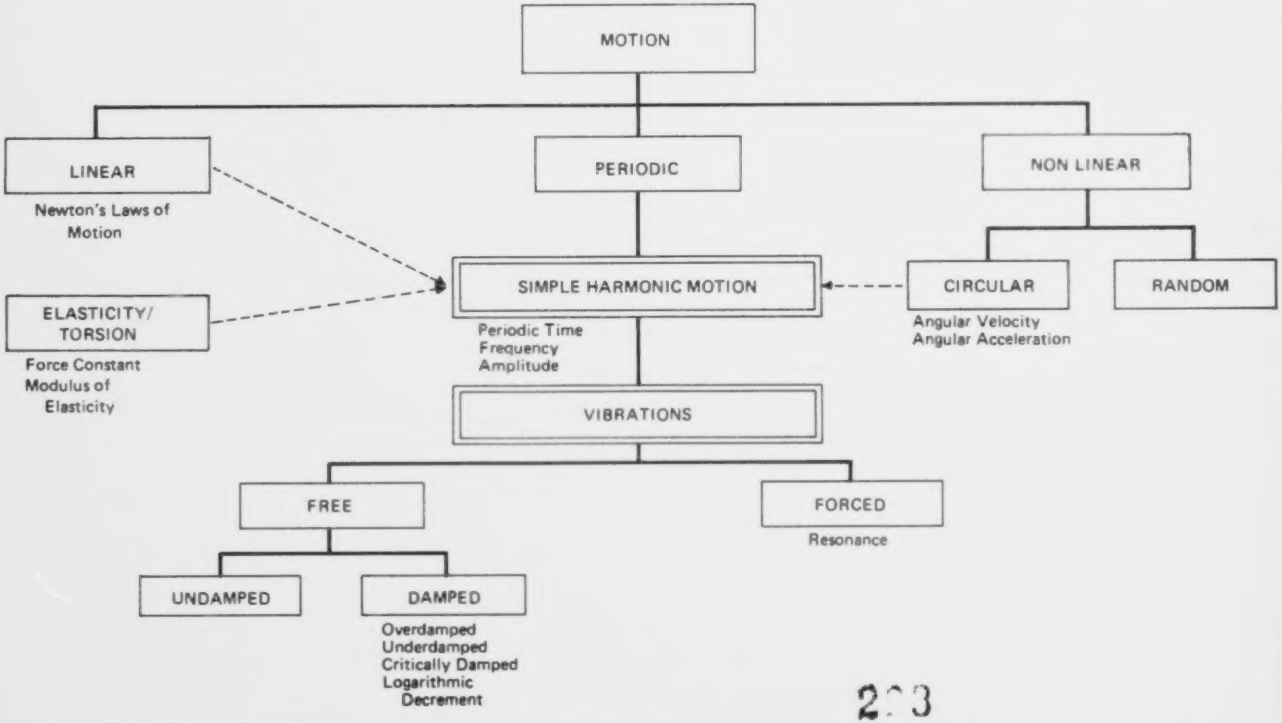
The activities of DECAP would need to encompass curriculum design as well as instructional materials design, development and production. It would need to be staffed by experts in instructional design and media specialists to ensure appropriate use of print-based, audiovisual and computer-based instructional packages (c.f. Figure 1). Subject matter experts could be seconded by the institutions/corporations that were making use of the services offered by DECAP. Alternatively, a team of DECAP experts could work with subject matter experts in their own settings. Various funding arrangements could be used. As well as providing financial aid for projects that qualify for Bank support under existing criteria, expertise and facilities could be offered to industrial and commercial corporations on a fee for service basis (capacity permitting) thus generating profits to support the DECAP operation.

While such an initiative may seem somewhat ambitious, it would avoid the potential pitfalls arising from communication difficulties, capacity constraints and parochiality associated with using existing instructional materials production infrastructures which are often already hard-pressed to meet local demands. Further, most existing distance education infrastructures are somewhat limited in the availability of specialist expertise and specialist production facilities to be able to guarantee outputs of consistently high quality, especially if additional demands are made on the production system through the letting of outside contracts. Further, the proposed centralization of instructional materials production could provide an appropriate agency for negotiating beneficial financial arrangements with government agencies (in relation to copyright, sales tax, etc.) and more particularly with the suppliers of production and delivery hardware (e.g. video systems, audiotapes, satellite transmission, microcomputers, etc.). In short, if aid programs are to make a significant impact, then a significant investment in support of a bold initiative might well be required.

More conservative approaches to the generation of genuine collaboration in distance education could lead to the establishment of regional networks of distance teaching resources consortia. Such networks would encourage sharing of resources and one-to-one collaborative arrangements between organizations, which (although desirable) would not be likely to have a major impact on social and economic development in the region. Major problems seem unlikely to be resolved through potentially piecemeal approaches; rather, bold initiatives are required. The challenge and the opportunity are both at hand.

The concentration of effort and resources into a centralized agency (DECAP) would appear to offer the best alternative. Let us not lose sight of the major problems facing the developing member countries; let us not lose sight of the potential impact of adequately supported barefoot teachers; let us take up the challenge. But let us take up the challenge, not in the spirit of missionary zeal, but in the spirit of cool calculating professionalism. The expertise is available. Let it be used to its best effect in the most appropriate organizational setting. Let us "bite the bullet" and set up a task force charged with detailing specifications and strategies for the establishment of a Distance Education Center for the Asia-Pacific region. The capacity of such a center to produce self-instructional resources of the highest quality, which could be used to support the work of the aforementioned barefoot teachers, could lead to a significant, cost-effective contribution being made to the human resource development needs of the Asia-Pacific region in a relatively short timescale.

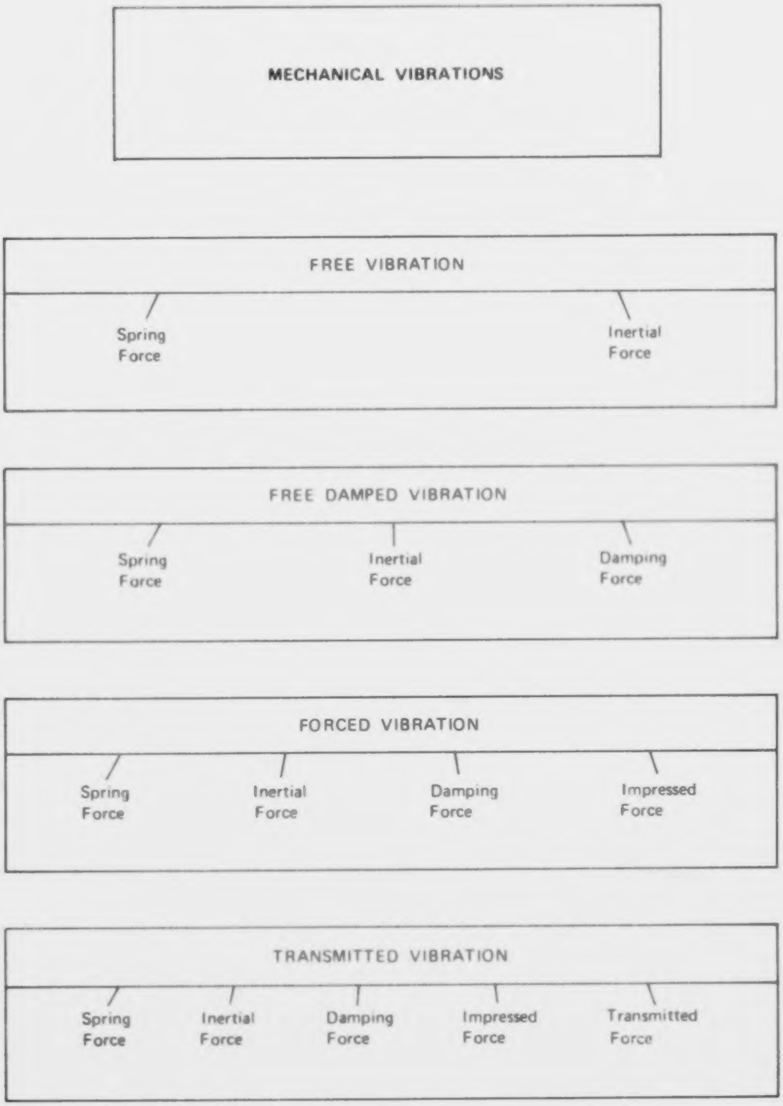
INSTRUCTIONAL DEVELOPMENT BLUEPRINT: EXEMPLARY KEY ELEMENTS


MOTION
LINEAR
Newton's Laws of Motion
PERIODIC
NON LINEAR
ELASTICITY/ TORSION
Force Constant
Modulus of Elasticity
SIMPLE HARMONIC MOTION
Periodic Time
Frequency
Amplitude
CIRCULAR
Angular Velocity
Angular Acceleration
RANDOM
VIBRATIONS
FREE
FORCED
Resonance
UNDAMPED
DAMPED
Overdamped
Underdamped
Critically Damped
Logarithmic Decrement

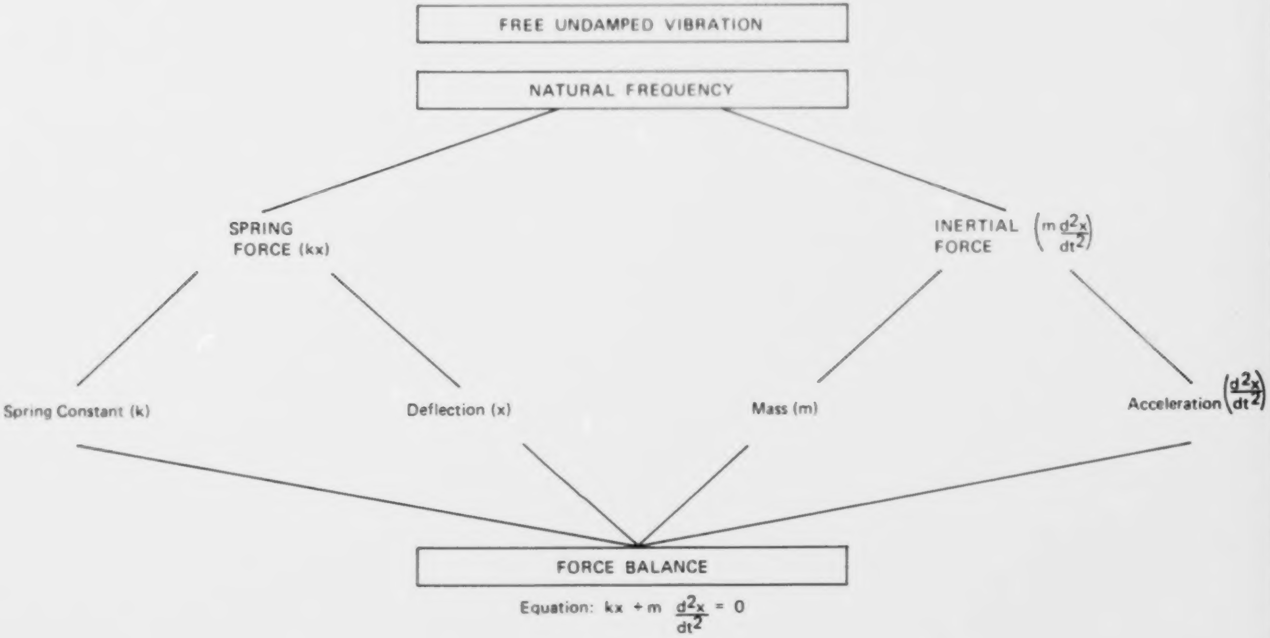
"Structure of knowledge related to types of motion: general overview"

GRADUAL ELABORATION OF THE STRUCTURE OF KNOWLEDGE UNDERLYING MECHANICAL VIBRATIONS

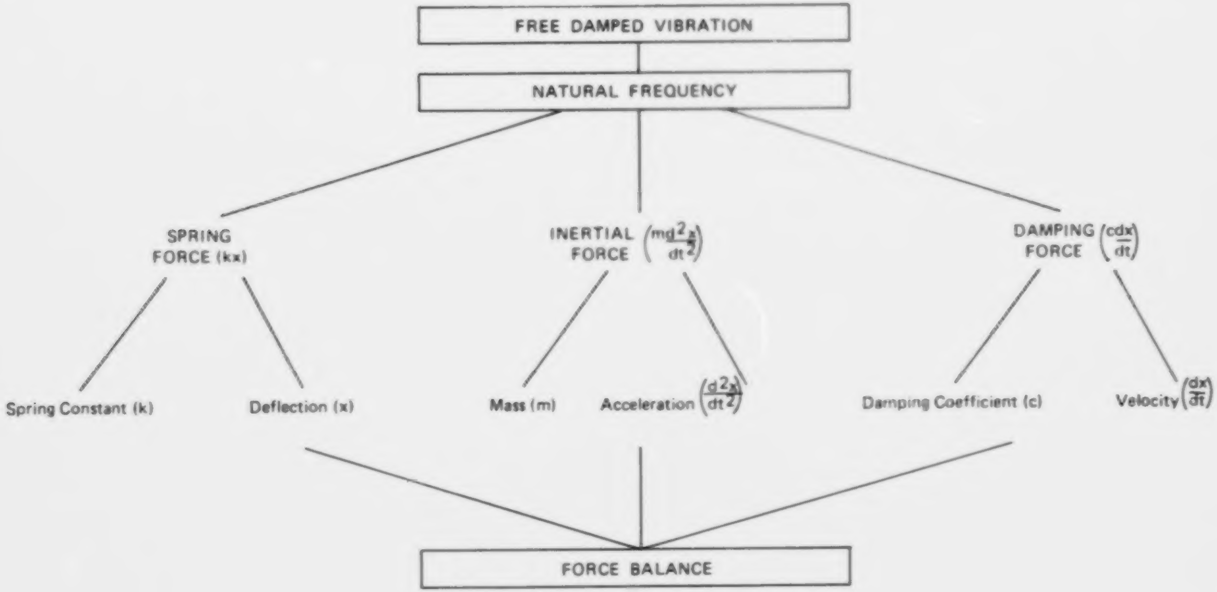
Appendix A
Page 2


MECHANICAL VIBRATIONS
FREE VIBRATION
Spring Force
Inertial Force
FREE DAMPED VIBRATION
Spring Force
Inertial Force
Damping Force
FORCED VIBRATION
Spring Force
Inertial Force
Damping Force
Impressed Force
TRANSMITTED VIBRATION
Spring Force
Inertial Force
Damping Force
Impressed Force
Transmitted Force

ELABORATION OF THE STRUCTURE OF KNOWLEDGE UNDERLYING FREE UNDAMPED VIBRATION

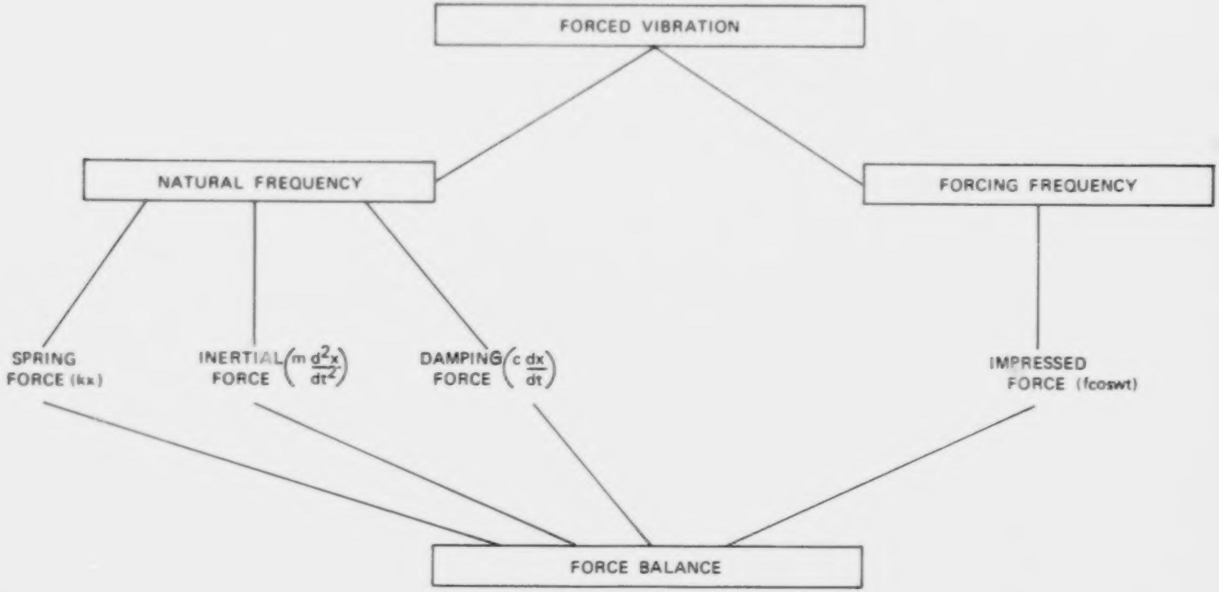

FREE UNDAMPED VIBRATION
NATURAL FREQUENCY
SPRING FORCE (kx)
INERTIAL FORCE $\left(m\frac{d^2x}{dt^2}\right)$
Spring Constant (k)
Deflection (x)
Mass (m)
Acceleration $\left(\frac{d^2x}{dt^2}\right)$
FORCE BALANCE
Equation: $kx + m\frac{d^2x}{dt^2} = 0$

ELABORATION OF THE STRUCTURE OF KNOWLEDGE UNDERLYING FREE DAMPED VIBRATION


FREE DAMPED VIBRATION
NATURAL FREQUENCY
SPRING FORCE (kx)
INERTIAL FORCE $\left(m\frac{d^2x}{dt^2}\right)$
DAMPING FORCE $\left(c\frac{dx}{dt}\right)$
Spring Constant (k)
Deflection (x)
Mass (m)
Acceleration $\left(\frac{d^2x}{dt^2}\right)$
Damping Coefficient (c)
Velocity $\left(\frac{dx}{dt}\right)$
FORCE BALANCE

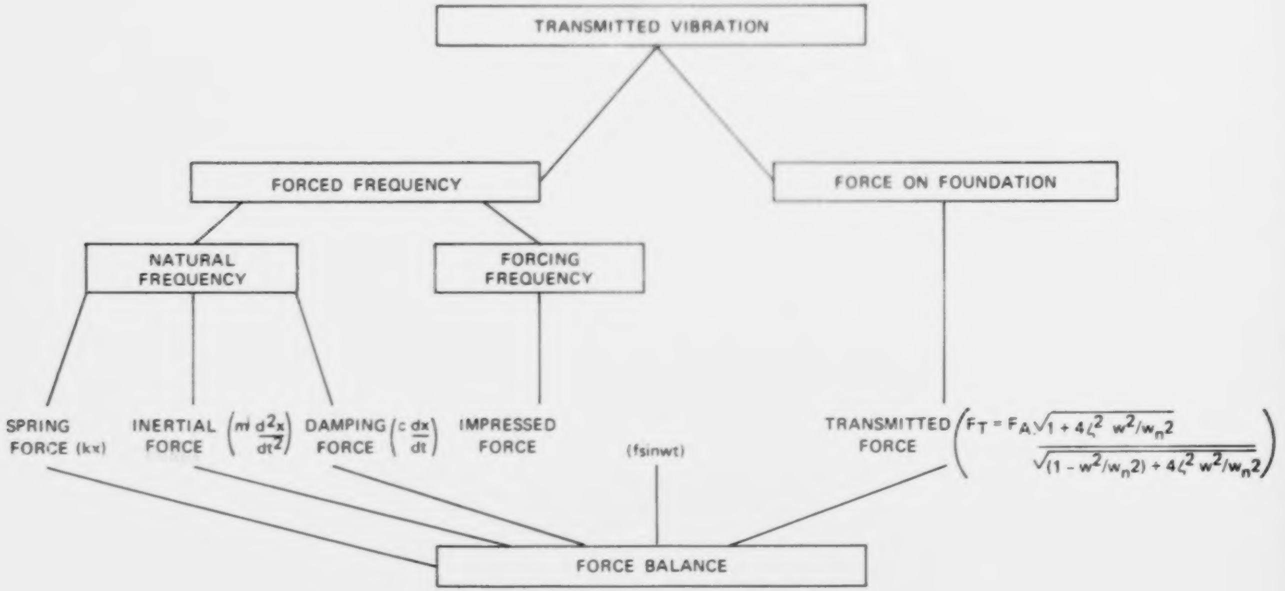
Equation: $M\frac{d^2x}{dt^2} + c\frac{dx}{dt} + kx = 0$

ELABORATION OF THE STRUCTURE OF KNOWLEDGE UNDERLYING FORCED VIBRATION


FORCED VIBRATION
NATURAL FREQUENCY
FORCING FREQUENCY
SPRING FORCE (kx)
INERTIAL FORCE $\left(m\frac{d^2x}{dt^2}\right)$
DAMPING FORCE $\left(c\frac{dx}{dt}\right)$
IMPRESSED FORCE (fcoswt)
FORCE BALANCE

Equation: $M\frac{d^2x}{dt^2} + kx + c\frac{dx}{dt} - f\cos wt = 0$

ELABORATION OF THE STRUCTURE OF KNOWLEDGE UNDERLYING TRANSMITTED VIBRATION

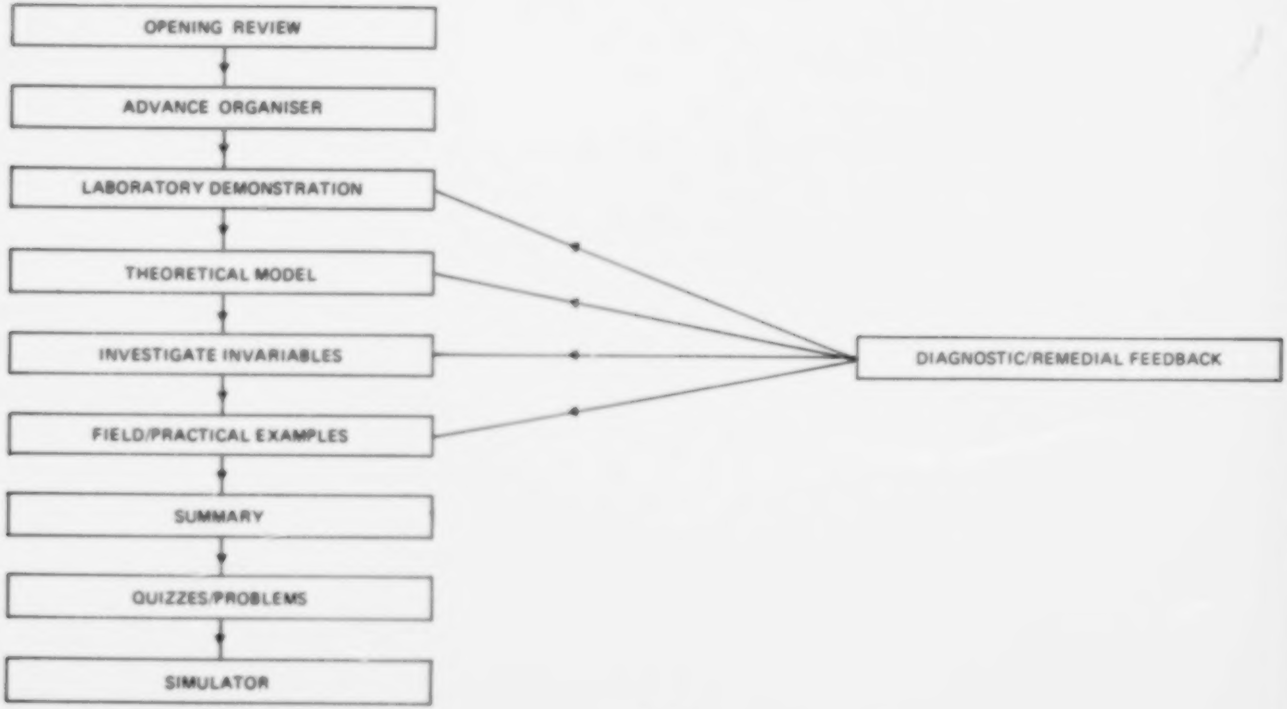

TRANSMITTED VIBRATION
FORCED FREQUENCY
FORCE ON FOUNDATION
NATURAL FREQUENCY
FORCING FREQUENCY
SPRING FORCE (kx)
INERTIAL FORCE $\left(m\frac{d^2x}{dt^2}\right)$
DAMPING FORCE $\left(c\frac{dx}{dt}\right)$
IMPRESSED FORCE
(fsinwt)
TRANSMITTED FORCE $\left(F_T = F_A\frac{\sqrt{1+4\zeta^2\ w^2/w_n2}}{\sqrt{(1-w^2/w_n2)+4\zeta^2\ w^2/w_n2}}\right)$
FORCE BALANCE

Equation: $\dfrac{\text{Max. Dynamic Force Transmitted}}{F} = \dfrac{\sqrt{(1+4\zeta^2\ w^2/w_n2)}}{\sqrt{(1-w^2/w_n2)2+4\zeta^2\ w^2/w_n2}}$

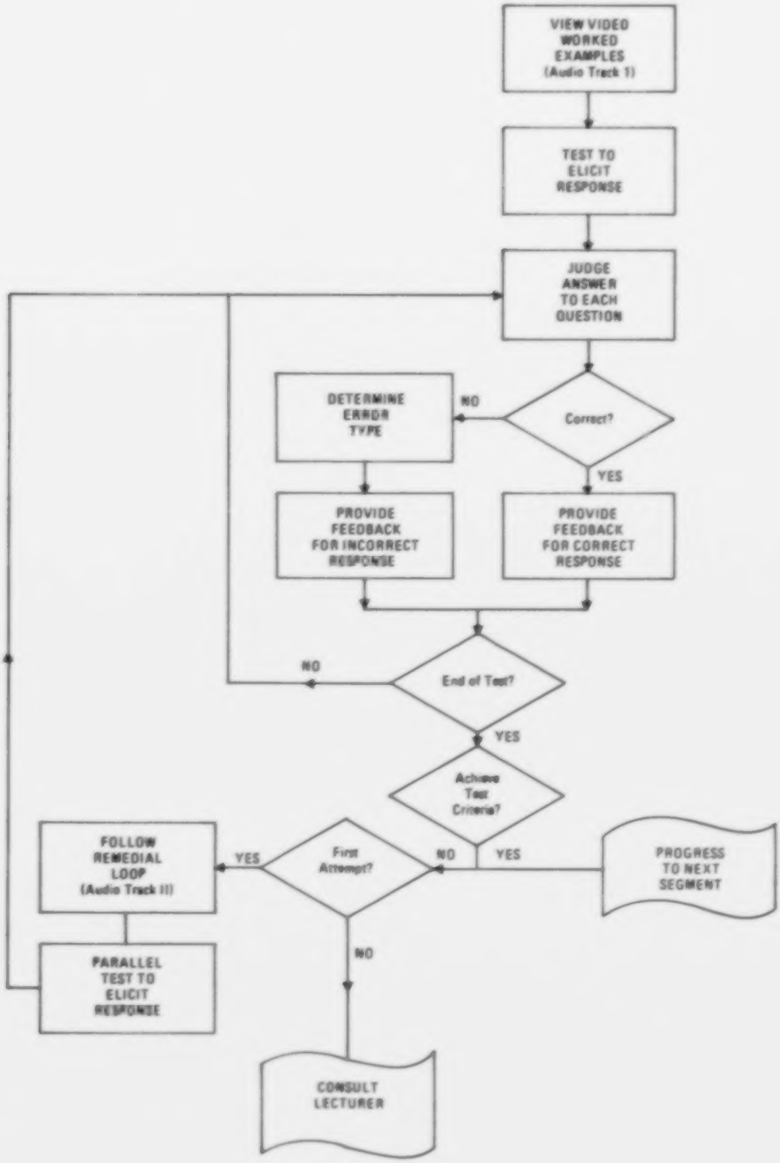
ELABORATIVE SEQUENCE UNDERLYING PRESENTATION OF EACH SEGMENT OF SUBJECT MATTER

GENERAL/SIMPLE LEVEL OF COURSE CONTENT		
EPITOME	REAL WORLD EXAMPLES	VIDEO-BASED
LEVEL 1	LABORATORY SIMULATIONS	VIDEO-BASED
LEVEL 2	GRAPHICAL REPRESENTATIONS	VIDEO- AND MICROCOMPUTER BASED
LEVEL 3	MATHEMATICAL MODEL ASSOCIATE DIPLOMA	VIDEO- AND MICROCOMPUTER BASED
LEVEL 4	MATHEMATICAL MODEL (BACHELOR'S DEGREE)	PRIMARILY MICROCOMPUTER BASED
INCREASINGLY DETAILED/ COMPLEX VERSIONS OF COURSE CONTENT		

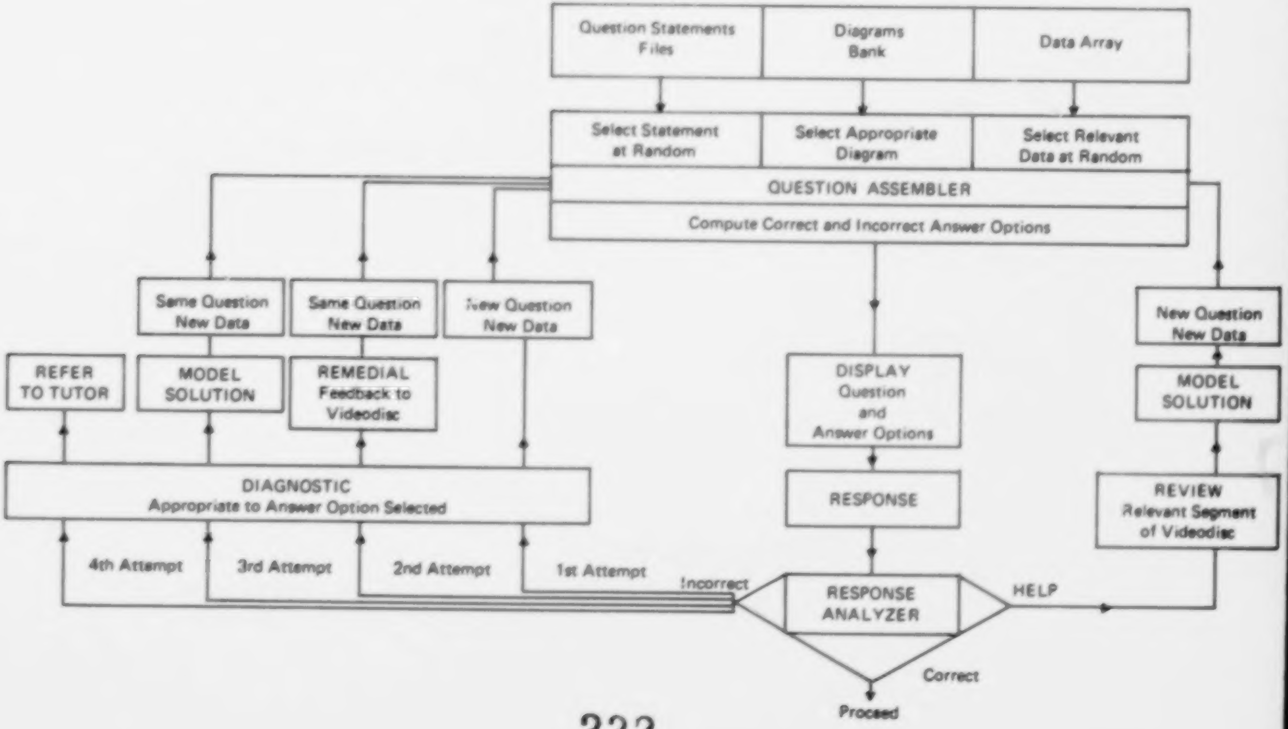
BASIC STRUCTURE OF COURSEWARE


OPENING REVIEW
ADVANCE ORGANISER
LABORATORY DEMONSTRATION
THEORETICAL MODEL
INVESTIGATE INVARIABLES
FIELD/PRACTICAL EXAMPLES
SUMMARY
QUIZZES/PROBLEMS
SIMULATOR
DIAGNOSTIC/REMEDIAL FEEDBACK

ACTIVITY CONTROL FLOWCHART: GENERAL STUDENT INTERFACE


VIEW VIDEO WORKED EXAMPLES (Audio Track 1)
TEST TO ELICIT RESPONSE
JUDGE ANSWER TO EACH QUESTION
Correct?
NO
YES
DETERMINE ERROR TYPE
PROVIDE FEEDBACK FOR INCORRECT RESPONSE
PROVIDE FEEDBACK FOR CORRECT RESPONSE
End of Test?
NO
YES
Achieve Test Criteria?
NO
YES
PROGRESS TO NEXT SEGMENT
First Attempt?
YES
NO
FOLLOW REMEDIAL LOOP (Audio Track II)
PARALLEL TEST TO ELICIT RESPONSE
CONSULT LECTURER

ACTIVITY CONTROL FLOWCHART: ELABORATED STUDENT INTERFACE


Question Statements Files
Diagrams Bank
Data Array
Select Statement at Random
Select Appropriate Diagram
Select Relevant Data at Random
QUESTION ASSEMBLER
Compute Correct and Incorrect Answer Options
Same Question New Data
Same Question New Data
New Question New Data
New Question New Data
REFER TO TUTOR
MODEL SOLUTION
REMEDIAL Feedback to Videodisc
DISPLAY Question and Answer Options
MODEL SOLUTION
DIAGNOSTIC Appropriate to Answer Option Selected
RESPONSE
REVIEW Relevant Segment of Videodisc
4th Attempt
3rd Attempt
2nd Attempt
1st Attempt
Incorrect
RESPONSE ANALYZER
HELP
Correct
Proceed

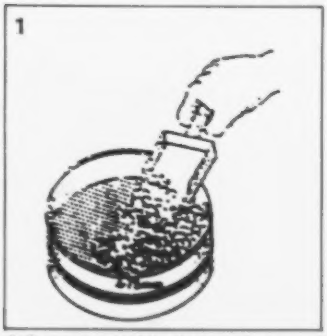
Appendix B

BULK DENSITY AND WATER ABSORPTION OF COARSE AGGREGATE

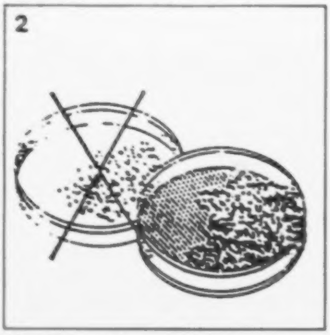
Objective: To determine the saturated surface-dry bulk density and water absorption of coarse aggregate using:

A balance and set of weights
Wire basket of 200 mm diameter and 400 mm high
Container 400 mm diameter and 600 mm high
Drying oven

Measure out a sample of aggregate of suitable mass

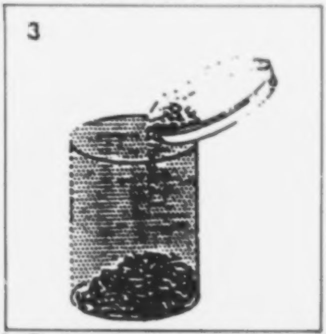


1. Put two scoopfuls of aggregate into a 4.75 mm A.S. sieve. Sieve the aggregate. Note the dominant size of the screenings if the dominant size is less than 19 mm continue sieving until 2 kg of screenings have been collected. If the dominant size is greater than 19 mm on the 4.75 mm sieve continue sieving until 5 kg of screenings have been collected.

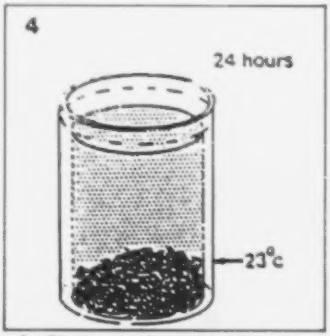


2. Compare the mass of undersize aggregate to screenings. If the ratio is less than 10% discard the undersize material. If the ratio is greater than 10% test the undersize material by the method for fine-aggregate.

Determine the surface-dry mass of the aggregate

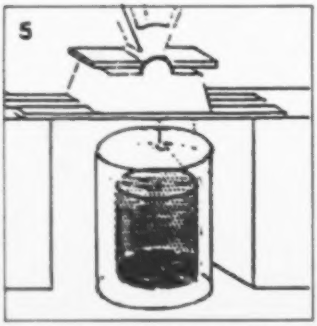


3. Tip the test portion into a wire basket.

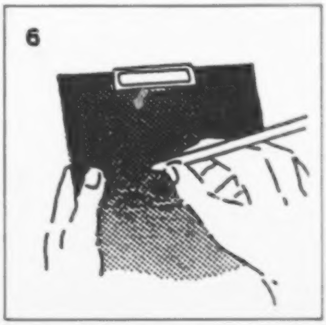


4. Fill the container with water at 23°C. Place the basket in the container and let it stand.

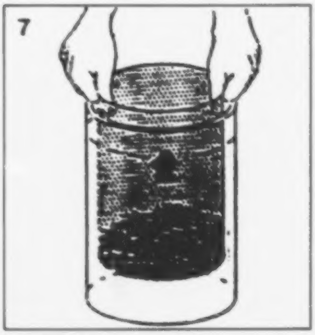
Appendix B
Page 2



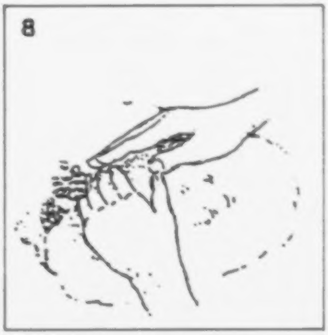
5. Weigh the casket containing the aggregate water suspended in a container of water so that the aggregate is concretely immersed.



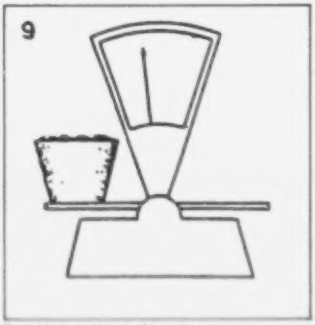
6. Record the immersed mass of the aggregate in Kg to the nearest gram.



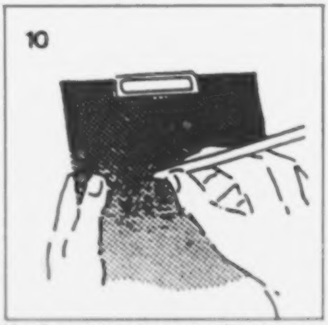
7. Lift the casket from the water and and tip its contents into a large absorbent cloth.



8. Roll the stones in the absorbent cloth until no visible film of water remains on the stones.

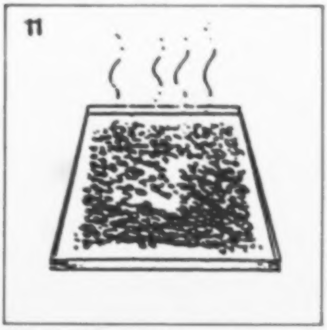


9. Weigh the surface dry stones.

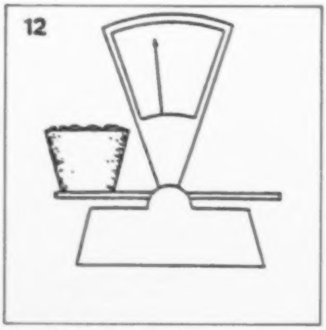


10. Record the saturated surface dry mass of aggregate in Kg to the nearest gram.

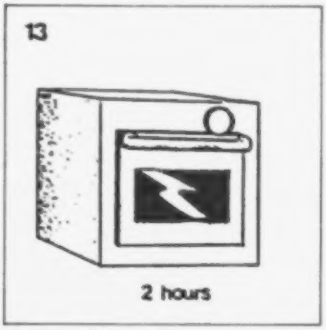
Determine the dry mass of the aggregate.



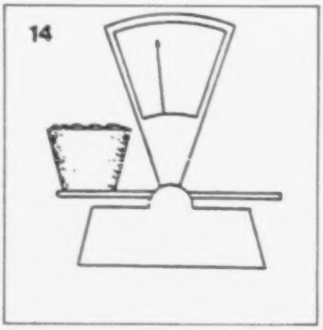
11. Dry the aggregate to constant mass by tipping it onto a drying tray and heating it in an oven set at 105 degrees C overnight.



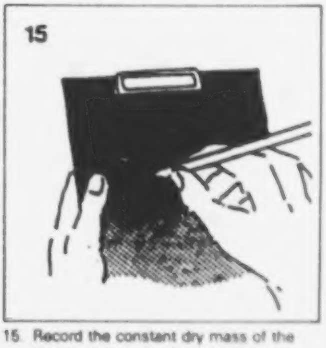
12. Weigh the aggregate.



13. Reheat for 2 hours.



14. Weigh again. If the mass has not changed, record it as the constant dry mass.



15. Record the constant dry mass of the aggregate in kg to the nearest gram.

Calculate the dry and surface dry bulk densities and the percentage of water absorption.

Bulk Density (Dry) =

$$\frac{\text{constant dry mass} \times 1000}{\text{saturated surface dry mass} - \text{immersed mass}}$$

Bulk Density (Saturated Surface Dry) =

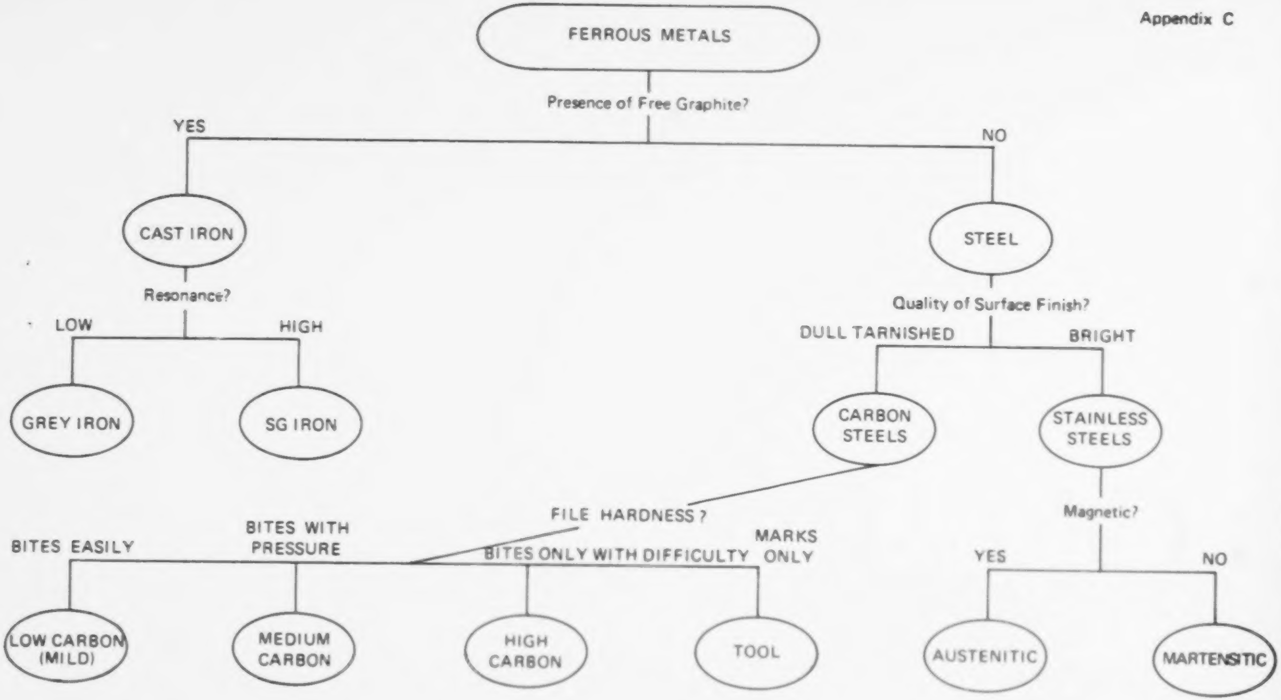
$$\frac{\text{saturated surface dry mass} \times 1000}{\text{saturated surface dry mass} - \text{immersed mass}}$$

Percent Water Absorption =

$$\frac{\text{saturated surface dry mass} - \text{dry mass}}{\text{dry mass}} \times 100$$

Extract from Unit 77102 "Civil Engineering Materials",
Darling Downs Institute of Advanced Education.

Appendix C


FERROUS METALS
Presence of Free Graphite?
YES
NO
CAST IRON
STEEL
Resonance?
LOW
HIGH
GREY IRON
SG IRON
Quality of Surface Finish?
DULL TARNISHED
BRIGHT
CARBON STEELS
STAINLESS STEELS
FILE HARDNESS ?
Magnetic?
BITES EASILY
BITES WITH PRESSURE
BITES ONLY WITH DIFFICULTY
MARKS ONLY
YES
NO
LOW CARBON (MILD)
MEDIUM CARBON
HIGH CARBON
TOOL
AUSTENITIC
MARTENSITIC

Extract from Thurlow, D. and Taylor, J.C., Engineering Materials, Southern Cross Education Centre, Toowoomba, 1983.

Planning, Management and Monitoring of Distance Education

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INTRODUCTION

Distance education has been catching up in Asia and the Pacific during the last two decades. This is in response to a variety of demands for education which exerts pressures on political systems. Even though the formal education system has expanded enormously, it is unable to meet the demand.[1] Since resources are limited, a massive expansion of the formal system is not possible. Moreover, the formal system suffers from certain rigidities which prevent some sections of society from access to it. This raises the question of inequality of educational opportunities. In several countries it was found that expansion led to dilution of educational standards resulting in the problem of quality. Thus the twin concerns of the policymakers in these countries are: providing wider opportunities for education and maintaining the quality of instruction. Distance education has been found to be an effective alternative within the reach of anyone who wants to have access to it.[2] In the coming years distance education is likely to be used to cater to a variety of educational demands. If distance education institutions are to provide high quality of instruction to learners, they need to be systematically planned and scientifically managed. Unlike their conventional counterparts, distance education institutions, as we shall see later in this paper, have dual characteristics – academic and industrial. There are several instances of well planned and managed distance education institutions providing high-quality instruction in Asia and the Pacific region. This paper proposes to examine planning, management and monitoring of distance education in the countries of the region.

WHAT IS DISTANCE EDUCATION

Before we proceed to examine planning, management and monitoring of distance education, it is necessary to have clear concepts about the term, "distance education", which is not a precise description. Distance education is known by several names, such as, correspondence education, home study, independent study, external study, open learning, open education, off-campus program, etc. There is what F.R. Jevons calls, a "bewildering nomenclature".[3] In Australia, its official name is External System. This description is not very much appreciated because it carries "vibes of old London external system which usually provides examination but not teaching".[4] In some other countries, the term "correspondence" is widely used but it has increasingly been replaced by the term "independent study" in North America. "Home Study" is sometimes used to describe correspondence programs of private schools both in North America and Europe. This also is disliked mainly because some schools are motivated largely by profit, particularly the private ones. Some of them are good, but not all. Further, correspondence institutions depend on print material. Distance education systems today lay emphasis not only on print, but also on other media. In fact, the multimedia approach is the cornerstone of distance education systems.

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[1] Sharma, M., *Distance Education*, Professional Staff Paper, Manila, Asian Development Bank, 1985, p. 1.

[2] Perraton, H., *Alternative Routes to Formal Education*, World Bank, 1982.

[3] Jevons, F.R., "Role of Distance Education: Towards Parity of Esteem," in *Technological Innovation: University Rules*, London, Association of Commonwealth Universities, 1983, p. 344.

In recent years, the term open learning is used extensively to convey the meaning of distance education. Open learning covers a wide range of innovations and reforms in the educational sector. Included are changes that aim to improve such things as the participation of learners, instructional design, methods of transmitting information and support to learners.[5] A very comprehensive document entitled "Open Learning" by Mackenzie, Postgate and Scupham was brought out by UNESCO in 1975. In it, the open learning is described as follows: "Such systems are designed to offer opportunities for part-time study, for learning at a distance and for innovations in the curriculum. They are intended to allow access to wider sections of adult population, to enable students to compensate for lost opportunities in the past or to acquire new skills and qualifications for the future. Open learning systems aim to redress social or educational inequality and to offer opportunities not provided by conventional colleges or universities."[6] In this system, restrictions on learning are fewer than those in formal educational institutions. Educational opportunities are planned deliberately so that access to knowledge is available to individuals in spite of barriers such as geographical distance. The distance education universities in the world are known as open universities. In these institutions the concept of openness is linked to the idea of access to educational opportunities. Openness usually involves: (i) people: it would not debar applicants on account of their lack of educational qualifications; (ii) place: learning would be home-based and not restricted to classrooms or a campus; and (iii) multimedia approach: the use of new methods and means of teaching.[7]

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[4] Jevons, F.R., "Role of Distance Education: Towards Parity of Esteem," in *Technological Innovation: University Rules*, London, Association of Commonwealth Universities, 1983, p. 344.

[5] Ruggles, R.H., et al, *Learning at a Distance and the New Technology*, Vancouver, Educational Research Institute of British Columbia, 1982, p. 3.

[6] Mackenzie, N., Postgate, R., and Scupham, J., *Open Learning Systems and Problems in Post-Secondary Education*, UNESCO Press, 1975, p. 11.

Distance education has been defined by several writers like Wedemeyer, Holmberg, Moore and Peters, each emphasizing certain aspects of the system.[8] It goes to the credit of Desmond Keegan for providing a synthesis of most of the definitions. On the basis of this, he finds that distance education has the following important characteristics:[9]

(i) the quasi-permanent separation of teacher and learner throughout the length of the learning process; this distinguishes it from conventional face-to-face education;
(ii) the influence of an educational organization both in planning and preparation of learning materials and in the provision of student support services; this distinguishes it from private study and teach-yourself programs;
(iii) the use of technical media; print, audio, video or computer, to unite teacher and learner and carry the content of the course;
(iv) the provision of two-way communication so that the student may benefit from or even initiate dialogue; this distinguishes it from other uses of technology in education; and
(v) the quasi-permanent absence of a learning group throughout the length of the learning process so that people are usually taught as individuals and not in groups, with the possibility of occasional meetings for both didactic and socialization purposes.

In addition, he finds that there are two other socio-cultural determinants which are necessary preconditions and necessary consequence of distance education. They are: (i) the presence of more industrialized features that in conventional oral education; and (ii) privatization of institutional learning.[10]

This paper has all the abovementioned characteristics of distance education in view when we refer to planning, management and monitoring.

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[7] Rumble, G., and K., Harry, (eds.), *The Distance Teaching Universities*, London, Croom Helm, p. 12.

[8] Wedemeyer, C.A., "Independent Study," in Knowles, A. S. (ed.), *International Encyclopedia of Higher Education*, Boston, North Eastern University, 1977; Holmberg, B., *Distance Education: A Survey and Bibliography*, London, Kogan Page, 1977; Moore, M.G., "Towards a Theory of Independent Learning and Teaching", *Journal of Higher Education*, 1973, p. 44; Peter, O., *Die Didaktische Struktur der Fernunterrichts*, Weinheim and Basel, Beltz, 1973.

[9] Keegan, D., *The Foundations of Distance Education*, London, Croom Helm, 1986, pp. 49–50.

[10] Keegan, D., *op. cit.*

APPROPRIATENESS OF DISTANCE EDUCATION IN ASIA AND THE PACIFIC

In the industrialized and developing countries of Asia and the Pacific region, distance education is being considered appropriate. In the developed countries of Asia and the Pacific region such as Japan and Australia, the conventional system has not been able to meet educational demands. Since Australia is a vast country, distance education is considered suitable to make education available to all those who are scattered or isolated. Australia was using radio to teach its children in the outback areas in the thirties of this century. At the tertiary level the University of Queensland provided for distance education as early as 1901.[11] In Japan, correspondence education goes back to the 1880s. But the real development in distance education occurred only in 1945 when the education system was radically reformed along democratic lines.[12] During the war, many school buildings were destroyed and the poverty of the parents prevented them from keeping their children at school. Education by correspondence was of great help to them. It was also found useful for adults whose education was interrupted by the war. The new education policy which was evolved emphasized that opportunities for higher education should be universally available irrespective of one's status in life. Correspondence education was seen as a system which could secure this objective. As a result, there are now strong distance education institutions at the school level. Radio (NHK) also started contributing in a big way to the growth of distance education in Japan. It started broadcasting lessons as early as 1953 while television gave its support to education in 1960. Universities and colleges started offering correspondence courses in the late 1940s. In recent years, distance education is used by people who look at home study as a means of obtaining liberal education. Earlier, it was helpful to those who wanted to update their knowledge. The University of the Air has been started to provide powerful support to distance education in the country.

In the developing countries, distance education is regarded as an alternative system to increase access to education. Since the traditional system, because of its rigidities, was unable to reach large sections of population, distance education in these countries started by making provision for students to appear for examination without being regular student; in other words, a privatization of institutional learning. Later, correspondence courses were introduced by conventional universities. The appropriateness of distance education has been stressed by several governmental and non-governmental studies. For instance, in Indonesia, distance education is meant not only to extend educational opportunities but also to strengthen the Government's commitment to improve the quality of education, and to make education more relevant to the national development needs. In this context the President of the Republic of Indonesia has remarked: "Due to the wide and scattered archipelago, Universitas Terbuka is an appropriate response to the need of increasing equality of opportunity to higher education."[13]

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[11] Store, R., and Chick, J., "Reaching Out in Queensland: A Decentralized Approach," in Smith, K. (ed.), *Diversity Down Under in Distance Education*, Toowoomba, Darling Downs Institute Press, 1984, p. 57.

[12] Kato, H., and Postgate, R., "Open Learning in Japan," in MacKenzie, N., Postgate, R. and Scupham, J., *op. cit.*, pp. 233-234.

Research findings all over the world justify the appropriateness of distance education both in developed and developing countries. In countries like UK, it is used for general education as well as continuing education. In Canada, although there is no national policy for distance education, it is provided by provinces and local authorities. In Asia and the Pacific region, the relevance of distance education has been greatly stressed. As a recent study of the Asian Development Bank on Education in Bangladesh points out: "The main emphasis of all educational efforts in a country like Bangladesh is to reach out to a vast number of people with a view to making them more productive at the least cost per person. Mass media are well-suited for this purpose."[14] The study also points out that distance education in Bangladesh should address itself to the following areas in the order of priority:

(i) universalization of primary education at the literacy level;
(ii) non-formal education programs to reach out to the masses; and
(iii) starting formal education programs by:
    (a) school and college broadcast; and
    (b) teachers' training strategies through television, radio and micro teaching modules.[15]

Several studies refer to appropriateness of distance education to the educational needs of Asia and the Pacific. Some of these studies are made within the countries themselves and some are from outside. For instance, the Committee on Central Universities in India, while examining the role of central universities stressed the need for providing a strong distance education system.[16] In Pakistan, the appropriateness of distance education was stressed as early as the 1970s which has led to the establishment of Allama Iqbal Open University (AIOU).[17] In Thailand, its importance was clearly recognized by the planning committee which planned the setting up of the Sukhothai Thammathirat Open University. In the related documents of the Open University, UK, and the UNESCO, we find strong justification for distance education. Rumble's study of the Open University of the UK prepared in response to the request of UNESCO, stresses the significance of open university.[18] It points out that open access as a policy has not undermined the quality of the university's output. The university was committed from the beginning to "excellence" and parity of standards with other universities.

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[13] Quoted in Suparman, A., *Management and Development of Universitas Terbuka, Indonesia*, Paper presented at the International Seminar on Distance Education: Experiences of Open Universities, New Delhi, IGNOU, p. 1.

[14] Asian Development Bank, Education Division, *Bangladesh: Sector Study on Education*, Manila, 1986, p. 149.

[15] *Ibid.*

Besides these, a few studies have been sponsored by international organizations to examine the scope of media in education. For instance, a recent study of UNESCO refers to the role media can play in education.[19] In the mid-1970s, the World Bank initiated a study to improve its information based on the role of radio education and development communication. This study has been brought out in two parts. The first part deals with a number of case studies on the use of radio in school education, formal education, out-of-school, non-formal education and for interactive development communication.[20] In this study, the authors concluded: "There is by now a substantial history of use of radio for distance learning in both high and low income countries; educational planners can be reasonably sure that this use of radio can be effectively implemented. However, though their costs appear low, much remains to be learned about the economics of distance learning systems and for what types of educational problems they provide the most effective solution."[21] Perraton, in his report to the World Bank on Open Education puts its succinctly: "The scale of demand has led to a search for alternative methods of education that can reach more people, or reach different people, or do so more cheaply. Distance education offers some of these possibilities."[22] In their book *Organising Educational Broadcasting*, David Hawkridge and John Robinson review the developments in educational broadcasting in a number of countries of

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[16] University Grants Commission, India, *Report of the Committee on Central Universities*, New Delhi, 1981.

[17] Allana, G.A., *Distance Education System and the Role of AIOU*, Islamabad, 1985, p. 3.

[18] Rumble, G., *Open University of the United Kingdom*, Milton Keynes, Open University, 1982.

[19] UNESCO, *Mass Media*, Paris, 1984.

[20] Spain, P.L., Jamison, D. T., and McAnany, E.G., *Radio for Education and Development: Case Studies*, vols. 1 & 2, World Bank Staff Reporting Paper No. 266, May 1977.

[21] *Ibid*, p. 136.

[22] Perraton, H., *Alternative Routes to Formal Education*, World Bank, 1982.

Africa, Asia, Europe, North America, Central America and South America.[23] In his well-known book, *Big Media, Little Media*, Wilbur Schramm explains the use of various media for education. "The developing countries, in particular, have seen the 'new media' as a way to raise the quality of instruction faster than it could be raised by increasing and upgrading the teacher corps, to supplement even good teaching with learning experiences impossible to create locally, and to extend the reach of education to areas where schools and teachers are not otherwise available."[24]

These studies and several others commissioned by UNESCO, World Bank and other organizations point out the crucial role assigned to distance education in both the developed and developing countries. It has the potential of heralding a revolution in education. Educational opportunities, and thereby hastening economic and social development. In addition, it will help in achieving national goals for education, such as universalization, vocationalization and improvement of quality including standards of education.[25] Recently, Education Sector Studies of Nepal and Bangladesh undertaken by the Bank clearly emphasize the need for its involvement in these activities.[26]

STRENGTHS AND WEAKNESSES OF DISTANCE EDUCATION

Unlike the formal system it is very flexible and accessible. Its courses and teaching systems do not impose rigidities. It provides very large numbers with access to education and it can reach people in their homes. The teaching material produced by several distance education institutions is of a high quality. What is unique about the material is that all its students have the benefit of the same standard material. In the conventional system, the quality of teaching varies from teacher to teacher, from one institution to the other in the same area. Most important, distance education is cost-effective and is found to be less expensive than the traditional education system. Flexibility and innovation provide much needed scope for modification and revision of the system to match changing needs and requirements. Rapid developments in technology are further strengthening the potentialities of distance education. As the use of the electronic media grows, the effect of this system improves. With the costs of these technologies decreasing, they will be extensively used to spread education.

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[23] Hawkridge, D., and Robinson, J., *Organising Educational Broadcasting*, London, Croom Helm, 1982.

[24] Schramm, W., *Big Media, Little Media*, Beverly Hills, Sage Publications, 1977, pp. 17–18. Also see: Ghosh, R., and Cartwright, G. F., (eds.), *Educational Technology and Innovations*, London, Croom Helm, 1983; Bastes, A.W. (ed.), *The Role of Technology in Distance Education*, London, Croom Helm, 1984; Frank, R.E., and Greenberg, M. G., *The Public's Use of Television*, Beverly Hills, Sage Publications, 1980; Allama Iqbal Open University, *Effectiveness of Media – Radio and Television in Distance Education System of Allama Iqbal Open University*, 1984, and Agarwal, B.C. and Sinha, S.K., (eds.), *Site to Insat*, New Delhi, Concept 1986.

[25] Sharma, M., *op.cit.*, p. 15.

[26] Bangladesh, *Educational Sector Study*, 1986, *op.cit.*

Despite its advantages, distance education has its weaknesses. A major weakness is that it leads to loneliness and isolation of the learner. Since distance education is home-based, the learner studies in isolation. He does not have much peer group interaction which helps not only in socialization but also in learning from each other. Hence, it is necessary to strengthen regional study centers to promote peer group solidarity and interaction among the learners.

There are other important problems which make the implementation of distance education difficult. In the eyes of the conventional academic, it does not have parity of esteem with the formal system. As Keegan points out, administrators of conventional systems and many distance educators who feel safer under the conventional umbrella tend to view distance education as a fringe form of normal education and take away its radicalness.[27] Conventional education and distance education has two forms of normal education, as Peters has postulated, is yet to be established. The innate conservatism of educators means that non-traditional forms of education are characterized by fragility, writes Keegan.[28] Yet another problem is the relationship between education and broadcasting. As Perraton has noted, traditionally they are "uncomfortable bedfellows".[29] The relationship between the two agencies has not been very smooth. If students are to benefit from broadcast, lessons must be repeated. "Repetition is of the essence, broadcasting, in contrast, glories in its fleetingness, the good broadcaster is always seeking novelty."[30] There have been problems of getting adequate time for broadcasting the lessons and even where the time was given, it is often found to be inconvenient. To overcome some of the problems inherent in the broadcast media such as lack of repetition, it is possible to switch over to audio and videocassettes. These two will be of great help to the learner in distance education. However, audio and videocassettes are very costly. As a result, the student in Asia and the Pacific cannot hope to make use of them for some time to come. Another weakness of the system is that some of the technologies, particularly television, which is used extensively, are not within the reach of a majority of the people. Very few persons in the countries of the region can afford to own a television set.

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[27] Keegan, D., "From New Delhi to Vancouver: Trends in Distance Education," in Daniel, J., Stroud, M.A., and Thompson, J. R., *op. cit.*, p. 42.

[28] *Ibid.*

[29] Perraton, H., "Distance Teaching North and South," in Daniel, J. S., *World Perspectives* Athabasco University, 1982, p. 19.

[30] *Ibid.*

The weaknesses of distance education are apparent, particularly, where they are dependent only on correspondence material. Unless a multimedia approach is adopted, some of the weaknesses of distance education cannot be removed. Thanks to the rapid changes in communication technology, today it is possible to use a variety of technologies to not only spread education, but also to improve its quality.

POLICIES AND PLANS FOR GOVERNMENTS

While it is not possible to deal with the educational policies of governments in all the countries, we shall refer to some of them. Afghanistan has a large population of illiterates and the Government is looking for ways to improve the educational picture. The structure of school programs is changing and new methods and materials are being introduced through seminars and in-service courses. Radio and television are being used for general system of distance education.[31] In Bangladesh, during the Second Five-Year Plan, emphasis was laid on eradication of illiteracy, broadening the base of primary education, and on developing low cost functional education by linking different levels of education with production processes. It also emphasized programs of non-formal education and training for adults. The Government has become aware of the potential of different media for distance education. To strengthen distance education, the National Institute of Education Media and Technology has been established. Further, the Government is now considering establishing an open university to meet the demands of higher education in the country.[32] In China, distance education has a long tradition. It has been extensively used in adult education with the definite objective of making the content of teaching relevant and practical. Nationwide reforms have been taking place in China to eliminate poverty and backwardness. Since this involves training of millions of people at all levels and in different walks of life, a series of changes are being proposed in education. Radio and television are being used in distance education both at school and tertiary levels. The establishment of Central Radio and Television University is the result of the country's determination to strengthen distance education in the current plan.[33] It is likely to receive further support in future. In India, distance education has been used both at school and university levels. However, the spread of education is very thin. With a view to expand education, the Seventh Five-Year Plan and the National Education Policy accord an important place to distance education.[34] The establishment of the Indira Gandhi National Open University will promote and strengthen distance education. Moreover, several state governments have announced their intention to establish state open universities.

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[31] UNESCO Regional Office for Education in Asia and the Pacific, *Bulletin – Distance Education in Asia and the Pacific*, *op. cit.*, p. 40.

[32] *Bangladesh: Sector Study on Education*, *op. cit.*

PLANNING, MANAGEMENT, MONITORING AND EVALUATION – CONCEPTS

A. Planning

Planning is preparation for action. It leads to a pre-determined strategy, a detailed scheme or program of action meant to accomplish an objective or several objectives simultaneously. A plan focuses on the what, why and how of achieving overall goals. Planning involves selection among alternatives. An essential feature of the planning process is that it identifies possible or probable outcomes of actions within a specific period before the project manager makes a commitment. In recent years, the importance of planning processes is stressed for educational institutions also. Planning is essential to bring about the desired changes in educational institutions, to promote culture of education and to improve their effectiveness and functional efficiency.

Distance education is a complex system and involves elaborate planning. There are three continuous stages, i.e. planning during conceptual stage, planning during evolutionary and growth stages and planning during maturity. After an institution is established, detailed planning regarding the objective, strategies and operational plans, implementation of plans, policies and procedures for control and evaluation need to be spelled out. In a well-established institution, it is necessary to review the performance so as to respond to the changing societal needs. Apart from sustaining the educational effectiveness and organizational efficiency, planning as a generic process will provide a continuous direction to the distance education institution. Finally, the purpose of all planning activity at institutional level is to ensure cost-effectiveness at the time of actual operations.

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[33] Yi-shan, W., Chinese Radio and Television University, *Prospects*, Vol. 14, No. 1, 1984.

[34] Planning Commission, Government of India, *Seventh Five Year-Plan*, New Delhi, 1985; Ministry of Human Resource Development, Department of Education, *National Policy on Education – 1986*, New Delhi, 1986.

B. Management

It is the function of management to translate plans into realities. This paper uses the term "management" to convey such activities as processes of planning, decision-making, leadership, implementation and evaluation. The management of distance education is different from the management of conventional universities. As Keegan puts it: "In traditional education, a teacher teaches; in distance education, an institution teaches. This is the radical difference."[35] Educational material has to be produced on a large scale and distributed to thousands of students scattered in different parts of the country. Also the technological aspect of distance education is very sophisticated. All these make distance education institutions more complex than the conventional institutions. In some sense they can be compared to industrial processes involving technology at production and distribution stages and incorporating features of constant monitoring and upgrading. Viewed as a system, as Kaye and Rumble think, the distance education institutions can be analyzed in terms of an integrated system of operating, logistic and regulatory subsystems.[36] (See Figure 1) Operating subsystem converts system inputs into outputs.[37] The main outputs of a distance learning system are courses and educated pupils. The function of the logistic subsystem is to procure and replenish inputs through activities such as purchase and maintenance of equipment. The regulatory subsystem is at the core of the system and facilitates coordination of various activities of the institution and relates organization to its environment. Kaye and Rumble say that planning, control and evaluation are the underlying processes in these subsystems.[38] In each of these subsystems, managerial tasks would center around three processes:

(i) determination and divisionalization of the activities;
(ii) allocation of the divisionalized activities as someone's assigned responsibility; and
(iii) delegation of authority commensurate with responsibility.

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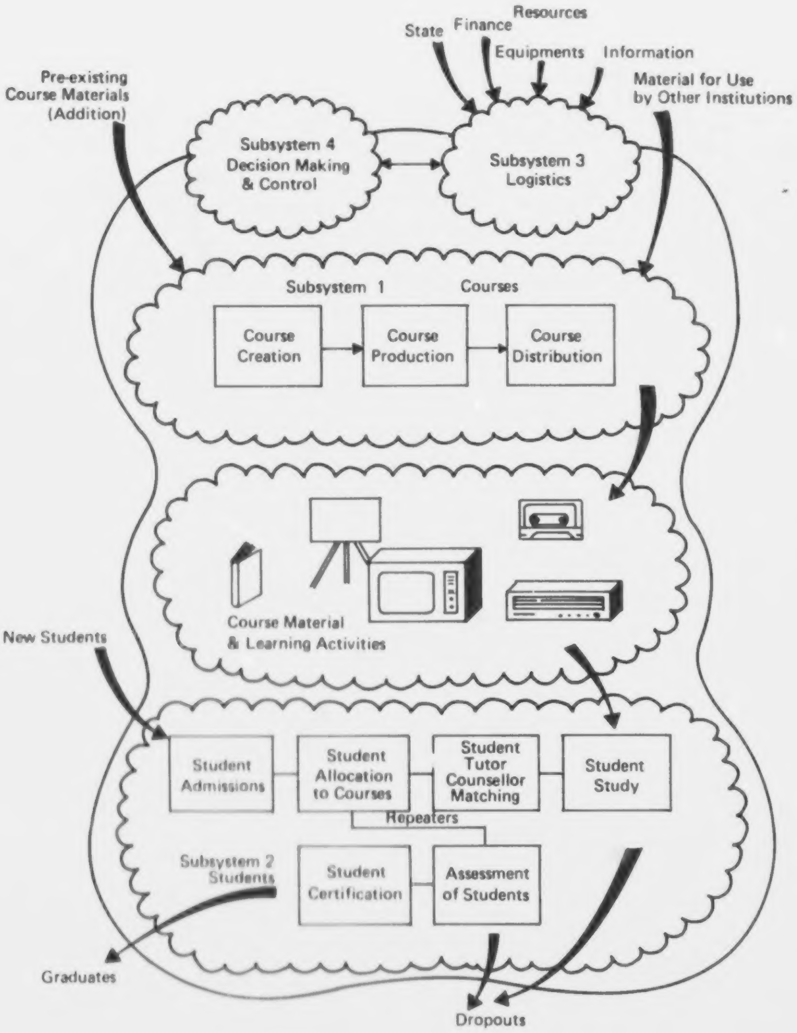
[35] Keegan, D., "On Defining Distance Education," in Sewart, D., Keegan, D. and Holmberg, B. (eds.), *Distance Education International Perspectives* , London, Croom Helm, 1983, p. 13.

[36] Kaye, A., and Rumble, G., *Distance Teaching for Higher and Adult Education*, London, Croom Helm, 1981, pp. 20–22.

[37] *Ibid.*

[38] *Ibid.*

Figure 1: A SYSTEMS VIEW OF DISTANCE EDUCATION


Resources
State
Finance
Equipments
Information
Pre-existing Course Materials (Addition)
Material for Use by Other Institutions
Subsystem 4 Decision Making & Control
Subsystem 3 Logistics
Subsystem 1
Courses
Course Creation
Course Production
Course Distribution
Course Material & Learning Activities
New Students
Student Admissions
Student Allocation to Courses
Student Tutor Counsellor Matching
Student Study
Repeaters
Subsystem 2 Students
Student Certification
Assessment of Students
Graduates
Dropouts

Source: Kaye, A. and Rumble, G., *op. cit.*

Unless these processes take place, it will be difficult to install viable management structures, organizational designs, monitoring, evaluation systems, etc. Keegan writes: "The administration of distance systems comes closer to general administrative theory than the administration of conventional education system."[39] It represents an industrialization process of educational administration and requires administrative skills that are akin to those of an industrial enterprise. As Keegan further observes, the distance system has daily preoccupations, such as lead times, deadlines, print runs, job schedule, type faces, delivery and dispatch. Administrative efficiency is essential for the successful functioning of a distance education system. The conventional system is highly decentralized where teaching takes place in each classroom. In contrast, the distance education system is highly centralized and any disharmony in coordination will bring the system to a grinding halt. Efficiency and coordination are the watchwords in this system.

The research findings on organizational designs point towards a continuous process of evolution of the structure as the scope of activities of the institution expands in terms of its concept as well as geographical coverage. From an informal one it transits to a formal one. Therefore, there is no one optimal structure design which would always serve a strategy with maximum efficiency and effectiveness. However, it would be advisable for an institutional planner to keep the following factors in mind while deciding about the institutional structure.

(i) It must encourage innovation on the part of academics, staff, students and all the other associates;
(ii) It must service the institutional objectives both in the short and long run;
(iii) It must facilitate the institutional communication process both within and outside with various interest groups;
(iv) It must contribute towards organizational climate by encouraging participation, rather than isolation, between the various officials and academics, and between the institution and the outside world;
(v) It should facilitate decision-making and various implementation processes;
(vi) It must fulfill the aspirations for professional growth of officials and academics; and
(viii) It must provide for task and role clarity for various agencies and top officials involved in the implementation. The stability of

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[39] Keegan, D., *The Foundations of Distance Education*, *op. cit.*, p. 196.

top-level leadership is also an essential requirement of the structuring process.

C. Monitoring and Evaluation

Monitoring is an essential dimension of both the planning and management processes. Monitoring involves accurate, relevant and timely information and data reaching the appropriate persons followed by a desirable corrective action. To plan the monitoring system, the project managers should address themselves to the following questions:

(i) Why is it being planned?
(ii) What aspects of the program – environment system – will be covered?
(iii) Who/which agencies will be responsible for generating and analyzing feedback information?
(iv) How will the feedback information be obtained?
(v) When and how frequently will the information be obtained?
(vi) Who will establish the accuracy of information? How will it be established?
(vii) Who will use the information and initiate the corrective action?
(viii) How much information is needed? How fast is it needed and what cost will be incurred?

There will be alternate choices for each of the questions raised above in planning a monitoring system. Monitoring also includes a review of the corrective action taken in response to feedback. Monitoring is distinguished from evaluation where judgments are made about quality and effectiveness of project performance. To conclude, monitoring is considered as a link between planning and control.

PLANNING, MANAGEMENT AND MONITORING IN THE DISTANCE EDUCATION INSTITUTIONS OF THE REGION

When we look at the pattern of distance education prevailing in the Bank's Developing Member Countries (DMCs), we come across three types:

(i) countries where distance education institutions are fairly old and strong (e.g. Australia and Thailand);

(ii) countries where distance education is of recent origin (e.g. India, Indonesia and Pakistan); and

(iii) countries where distance education is yet to make a headway (e.g. Bangladesh and Nepal).

Therefore, strategies of planning, management and monitoring have to be related to the stages of development of distance education. While the forms of distance education vary from country to country and sometimes within the country (Japan and India), they can be broadly grouped under two headings: (i) autonomous institutions; and (ii) mixed or hybrid institutions.

Autonomous institutions are legally independent and are free to determine their own curricula and award degrees. From the point of view of their status, they are like the conventional universities. The Allama Iqbal Open University in Pakistan, the STOU in Thailand, Open University in Sri Lanka, University of the Air in Japan, Central China Radio and Television University in China, the Indira Gandhi National Open University and the Andhra Pradesh Open University in India are good examples of this category. Legally they are corporate bodies and have their own governing bodies. As a result, they are in a position not only to innovate but also provide flexibility in education to their students. Because of their autonomous character, they will be in a position to understand the diverse problems of their heterogeneous students.

Mixed institutions are places where a special teaching department or faculty and its academics are responsible for teaching both "on-campus" and "off-campus" students. These institutions provide education for both the types of students. The University of Queensland, the University of New England and Deakin University are examples of mixed or hybrid institutions. Similarly, correspondence course units of conventional universities in India also come under this category. The main characteristic of mixed or hybrid institution is that the same courses which are offered to the "on-campus" students are offered to the "off-campus" students. The two categories of students take the same examinations and are awarded the same degrees. In some of these mixed institutions, e.g. Australia, the academics have dual responsibility, that is, to teach the on-campus as well as off-campus students. Here the problem of parity of standards does not arise because the same courses are studied by both the types of students. The difficulty, however, of this system is that there is a composite institution dealing with both face-to-face and distance education.

A. Planning

There have been three types of planning in distance education institutions.

1. Planning During Conceptual Stage

Before a distance education institution is set up, it is necessary to ask such questions as – why a distance education institution becomes necessary in a country? Who is to examine the feasibility and desirability of such an institution – a planning committee or an external consultancy? Who will take decision to set up a distance education institution: (i) federal government or provincial government; (ii) university or an existing institution; or (iii) a private body? What is the time frame for setting up such an institution and what are the resources allocated? What are the objectives of distance education both in the short and long-term? Who will provide the funds during various phases? Who will be the collaborators? These are the more likely questions around which the entire pre-project planning would revolve. In different situations, their relative importance may vary but answers to these questions would form the essential ingredients of planning. Several countries in the region have undertaken planning during the conceptual stage. Before the establishment of open universities, they have first done preliminary planning i.e. undertook a feasibility study. Usually, a committee has gone into the assessment of the educational needs in the country. In the light of these needs, they have recommended the establishment of autonomous distance education institutions. In Thailand, a Planning Committee did the spade work relating to the establishment of an open university.[40] In Pakistan, the university was established by an Act of Parliament following the New Education Policy of 1972–80.[41] It referred to the provision of educational facilities for the people who cannot leave their homes and jobs, and also providing facilities for the training of teachers. Although in China there is a long tradition of correspondence education, establishment of the Central Radio Television University (CRTVU) is the result of the recommendation of the Steering Committee which consisted of representatives of various ministries of education, broadcasting, administration, electronics, finance, post and telegraph communication, National Planning Commission and the trade unions, etc. The Committee reported to the State Council which was chaired by the Minister of Education with the Director of Broadcasting Bureau as Vice-Chairman. As a result of the recommendations of this Committee, the University was established.[42] In India, the two open Universities that have been established – one at the state level and the other at the national level – are the result of the reports submitted by expert committees appointed by the respective governments.[43] Thus, we see that in the case of autonomous institutions, planning at the conceptual stage has been done with regard to the establishment of open universities. Whether such an exercise is undertaken in mixed or hybrid institutions is not also very clear because this is done internally by the university which sets up a distance education unit. However, there are instances of policy recommendations being made on this subject. Examples of this are to be found in India and Australia. The Government of India constituted a Committee in 1961 under the chairmanship of D.S. Kothari to consider the feasibility of starting correspondence courses in India. The Committee recommended their establishment.[44] In the 1950s, the Government of Australia appointed the Murray Committee. This Report (1957) supported external studies. Then came the Martin Report (1964) which was not sympathetic to external studies. In recent years, the Karmel Committee was constituted by the Government "to enquire into desirability and means of expanding opportunities in Australia for extramural degree courses at university standard and to make recommendations".[45] The Committee in its report in 1974 rejected the United Kingdom model of a single institution open university. It favored the establishment of National Institute of Open Tertiary Education which should work through existing institutions.

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[40] Srisa-an, W., "Evaluation of Higher Distance Education Results: The Case of Sukhothai Thammathirat Open University of Thailand," in Universidad National De Educacion a Distancia, *Evaluation of Higher Distance Education Results*, Madrid, 1983.

[41] Allana, G.A., *op. cit.*

2. *Planning During Evolutional and Growth Stage*

In this phase, there are two major areas of planning: first, planning the launch of initial courses and second, planning of the physical institution including the technological infrastructure and recruitment of intellectual services. The plans in each of these two major areas have to be integrated. For example, the availability of intellectual resources (internal or external) will determine the progress that might be obtained in terms of launching the courses. In Table 1, we have listed some of the major planning tasks in both areas. In actual practice, these planning activities are further broken into minute details for drawing flow charts. These charts are periodically modified to accommodate exigencies. During the evolutionary and growth stages planners in distance education institutions (autonomous as well as mixed) have asked several questions in order to organize their own work.[46] These questions broadly relate to students, courses, media, faculty, assessment, examination, organization and management, finance, date of opening, and such activities like allocation of money, office accommodation, recruitment of staff and making arrangements for audiovisual production. The crucial issues to be handled by all planners are: what is the level and source of funding? What are the needs of accommodation, in the short and long-term? The location of the university also poses problems. Then comes the issue of staff: how many and how to recruit them? Having attended to these basic issues, planning then has concentrated on the types of students to be covered, geographical distribution, entry requirements, study time of students, the types of academic programs to be started, number of courses, duration of courses and the teaching year. Planners have to think of the media to be used. Such crucial decisions like preparation of print material, its production and distribution are to be taken. Action has to be initiated regarding broadcast media. What is the proportion of broadcast media in the total learning package? Student support is another important aspect. This includes tutorial classes, study, counselling, watching television, doing experiments and taking tests. The type of local centers to be established is to be decided. Then comes assessment and examination wherein form, frequency, location and personnel are planned. The experiences of distance education institutions in the region covered by the Bank are worth recording. Some experiences are similar, but others vary in planning and recruitment of staff and production of audiovisual material, examples are China, India and Pakistan. Methods of financing vary too. For example, most of the funding was done by the Government in Andhra Pradesh Open University, but in the Sukhothai Thammathirat Open University, most of it was raised by the institution.

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[42] McCormick, Robert, Central Broadcasting and Television University, People's Republic of China, in Rumble, G., and Harry, K., (eds.), *Distance Teaching Universities*, London, Croom Helm, 1982, p. 58.

[43] Government of Andhra Pradesh Department of Education, *Towards Open Learning System*, 1982 (Chairman, G. Ram Reddy); *Report of the Working Group on Open University*, 1974 (Chairman: G. Parthasarathi); *Indira Grandhi National Open University Project Report*, 1985 (Convenor: G. Ram Reddy).

[44] *Report of the Expert Committee on Correspondence Courses and Evening Colleges*, Ministry of Education, Government of India, New Delhi, 1963 (Chairman: D.S. Kothari).

[45] Northcott P., "Tyranny of Distance and Proximity," Smith K., ed., *op. cit.*, pp. 43–49.

3. Planning During Maturity

The AIOU in Pakistan and the STOU in Thailand have been doing exercises of this nature. In this region, most of the distance education institutions are of recent origin. Only in Australia, some of the mixed mode institutions are fairly old and well established, e.g. the University of Queensland. The main problem in Australia appears to be fragmentation and duplication of courses.

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[46] See Appendix A.

The planning tasks during the maturity phase can be divided into two major areas namely, the review of existing courses and planning of new courses and planning by way of diversification. Some courses have a life cycle and if they are no longer in demand, the institution should take the lead in withdrawing them. This is necessary to keep the institution in finely tuned.

Simultaneously, the obsolete courses have to be substituted by new courses based on monitored changes in the society. Sometimes the educational institution may also diversify its activities such as open television transmission or marketing of educational cassettes. The feasibility of all such new ventures is measured in terms of synegies between existing operations and the new ones.

B. Management

The management of autonomous institutions is different from the management of mixed institutions. The broad framework of the management system of autonomous distance education institutions is similar to conventional universities, though it may be different in its organizational details. For instance, in Pakistan, the President of Pakistan is the Chancellor, the Minister for Education is the Pro-Chancellor (Chart I), and the Vice-Chancellor is its academic and administrative head. As in the case of conventional universities, the important decision-making bodies of the University are the Executive Council and the Academic Council. In Indonesia, the Rector is the head of the university who is assisted by Assistant Rector (Chart II). In Thailand, the governing bodies of the university are the University Council and the Academic Senate. The Chairman of the Council is appointed by the King (Chart III). [47] It elects one of its members as the Vice-Chairman. The Academic Senate is responsible for the academic affairs of the University. The Rector is the academic and administrative head of the University and is assisted by a number of Vice-Rectors. In India, the President of India is the Visitor of the Indira Gandhi National Open University as is the case in other central universities (Chart IV). There is a Vice-Chancellor who is the academic and administrative head. He is assisted by a few Pro-Vice-Chancellors. The decision-making bodies are the Board of Management, Academic Council and the Planning Board. The management

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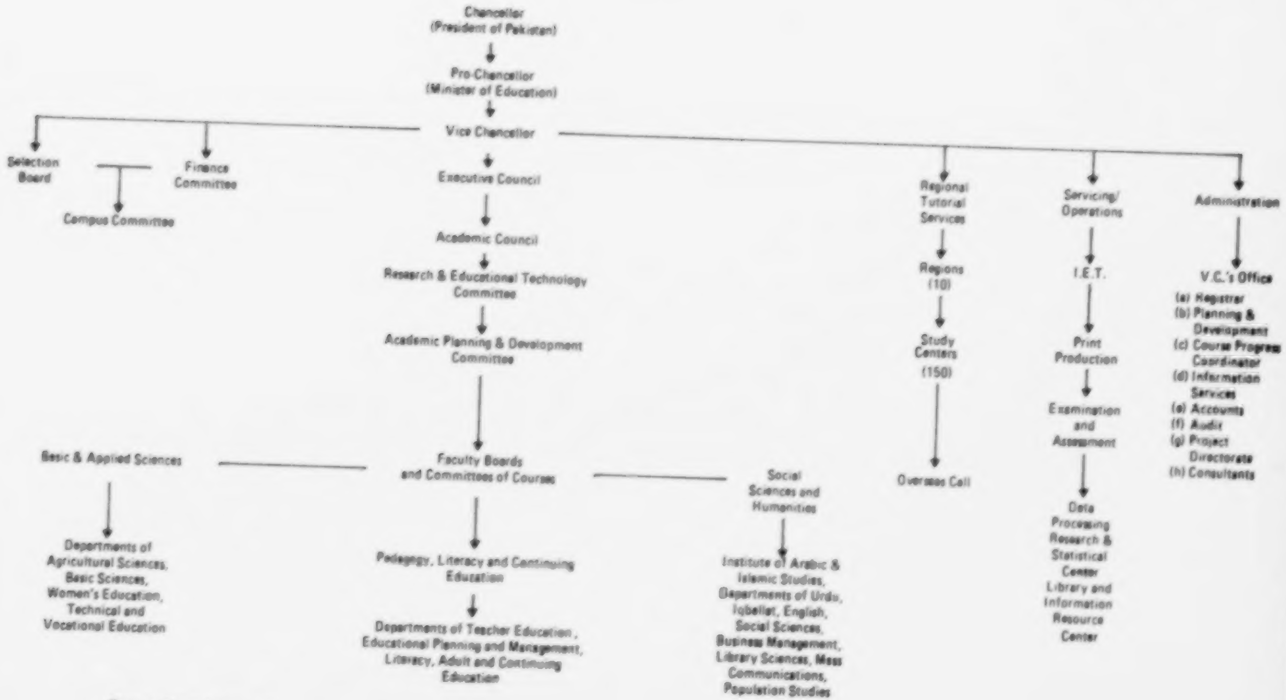
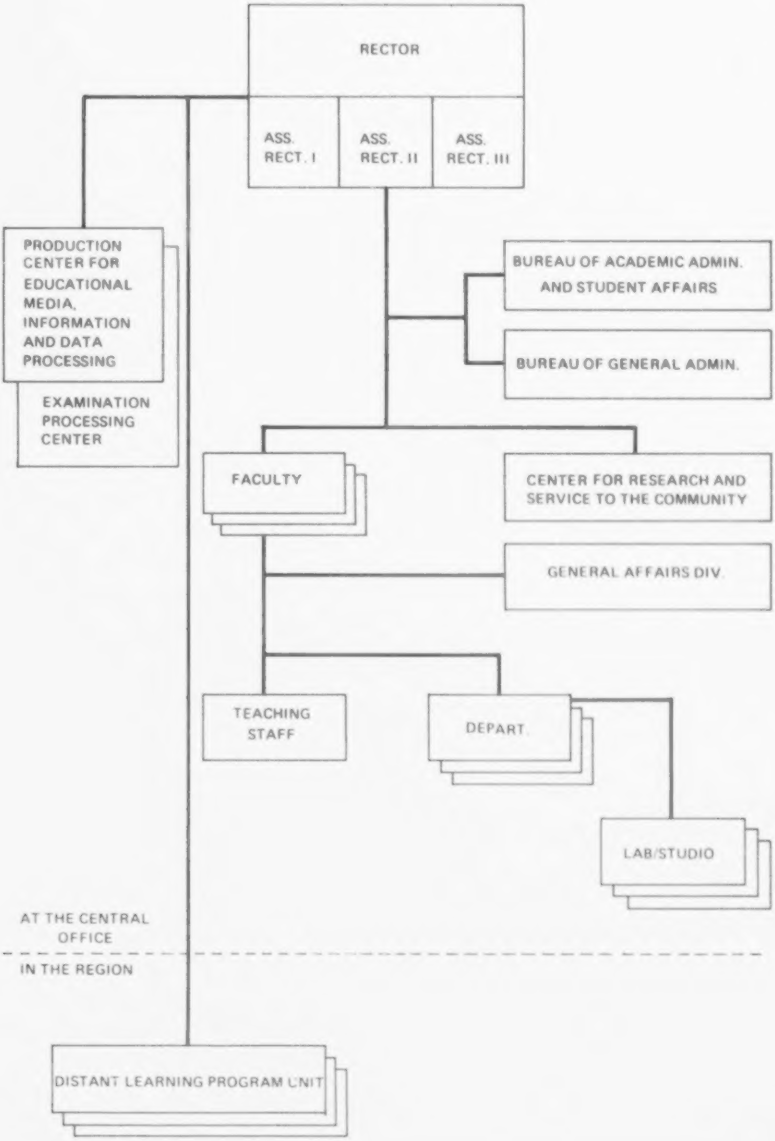
[47] Srisa-an, W., *op. cit.*

CHART I
ALLAMA IQBAL OPEN UNIVERSITY
PAKISTAN


Chancellor (President of Pakistan)
Pro-Chancellor (Minister of Education)
Vice Chancellor
Selection Board
Finance Committee
Campus Committee
Executive Council
Academic Council
Research & Educational Technology Committee
Academic Planning & Development Committee
Faculty Boards and Committees of Courses
Basic & Applied Sciences
Departments of Agricultural Sciences, Basic Sciences, Women's Education, Technical and Vocational Education
Pedagogy, Literacy and Continuing Education
Departments of Teacher Education, Educational Planning and Management, Literacy, Adult and Continuing Education
Social Sciences and Humanities
Institute of Arabic & Islamic Studies, Departments of Urdu, Iqbaliat, English, Social Sciences, Business Management, Library Sciences, Mass Communications, Population Studies
Regional Tutorial Services
Regions (10)
Study Centers (150)
Overseas Cell
Servicing/ Operations
I.E.T.
Print Production
Examination and Assessment
Data Processing Research & Statistical Center
Library and Information Resource Center
Administration
V.C.'s Office
(a) Registrar
(b) Planning & Development
(c) Course Progress Coordinator
(d) Information Services
(e) Accounts
(f) Audit
(g) Project Directorate
(h) Consultants

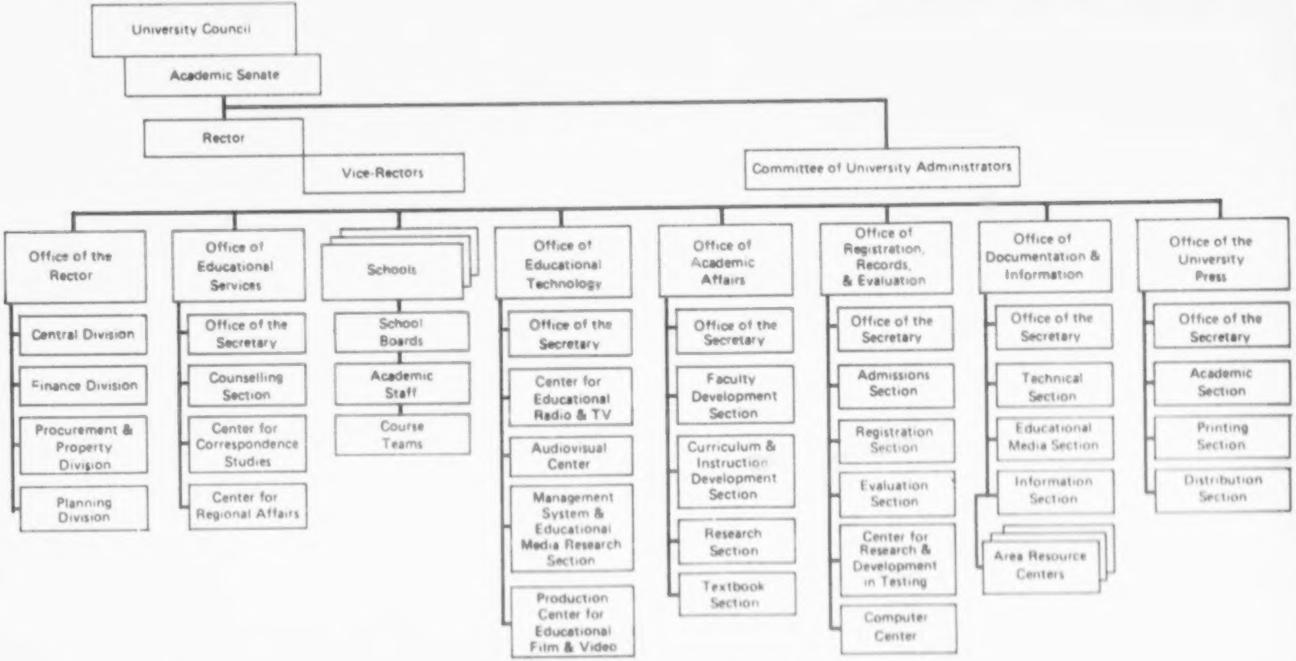
Source: Allana, G.A., *op. cit.*

ORGANIZATIONAL CHART II
THE UNIVERSITAS TERBUKA, INDONESIA


RECTOR
ASS. RECT. I
ASS. RECT. II
ASS. RECT. III
PRODUCTION CENTER FOR EDUCATIONAL MEDIA, INFORMATION AND DATA PROCESSING
EXAMINATION PROCESSING CENTER
BUREAU OF ACADEMIC ADMIN. AND STUDENT AFFAIRS
BUREAU OF GENERAL ADMIN.
FACULTY
CENTER FOR RESEARCH AND SERVICE TO THE COMMUNITY
GENERAL AFFAIRS DIV.
TEACHING STAFF
DEPART.
LAB/STUDIO
AT THE CENTRAL OFFICE
IN THE REGION
DISTANT LEARNING PROGRAM UNIT

Source: Suparman, A., *op. cit.*

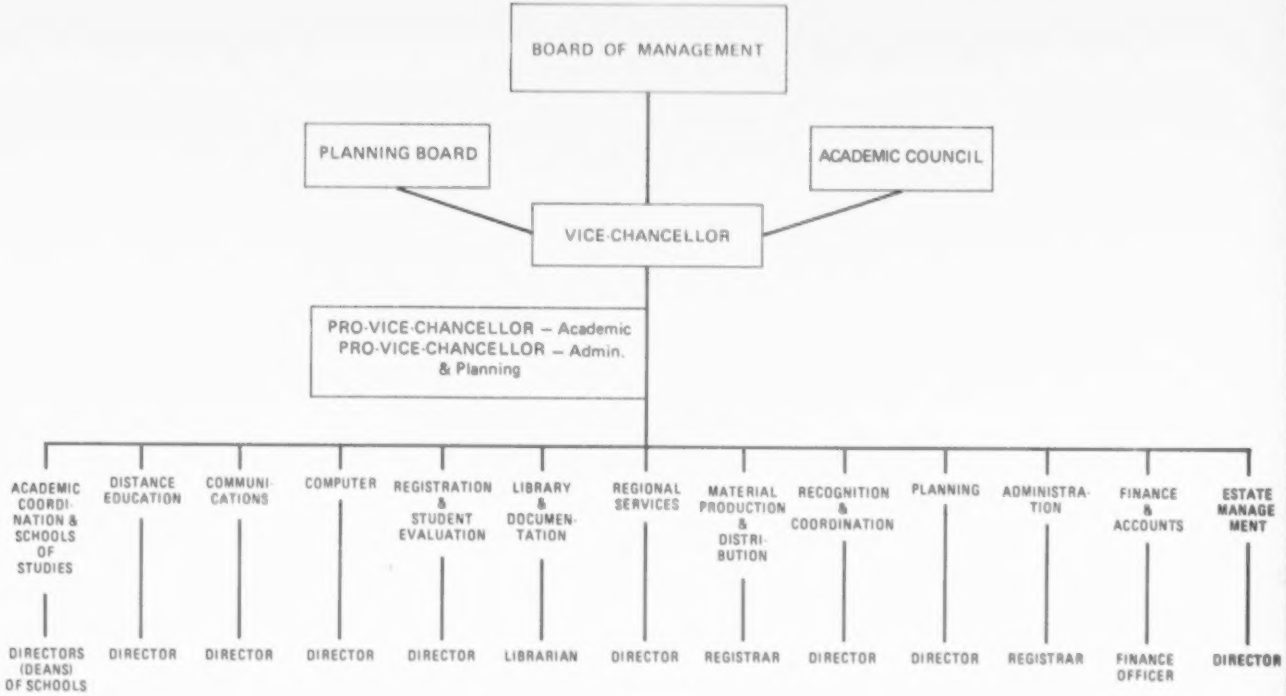
ORGANIZATIONAL CHART III
SUKHOTHAI THAMMATHIRAT OPEN UNIVERSITY
THAILAND


University Council
Academic Senate
Rector
Vice-Rectors
Committee of University Administrators
Office of the Rector
Central Division
Finance Division
Procurement & Property Division
Planning Division
Office of Educational Services
Office of the Secretary
Counselling Section
Center for Correspondence Studies
Center for Regional Affairs
Schools
School Boards
Academic Staff
Course Teams
Office of Educational Technology
Office of the Secretary
Center for Educational Radio & TV
Audiovisual Center
Management System & Educational Media Research Section
Production Center for Educational Film & Video
Office of Academic Affairs
Office of the Secretary
Faculty Development Section
Curriculum & Instruction Development Section
Research Section
Textbook Section
Office of Registration, Records, & Evaluation
Office of the Secretary
Admissions Section
Registration Section
Evaluation Section
Center for Research & Development in Testing
Computer Center
Office of Documentation & Information
Office of the Secretary
Technical Section
Educational Media Section
Information Section
Area Resource Centers
Office of the University Press
Office of the Secretary
Academic Section
Printing Section
Distribution Section

Source: Srisa-an, W., *op.cit.*

CHART IV

I.G.N.O.U. ORGANIZATIONAL STRUCTURE

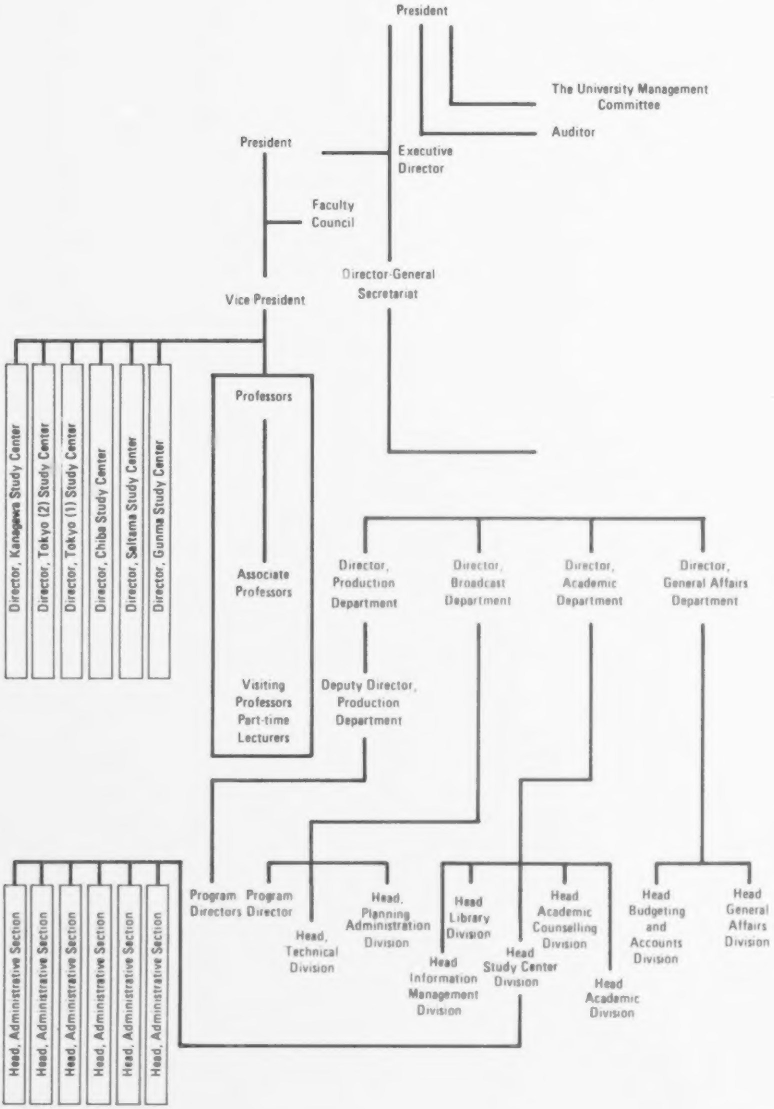

BOARD OF MANAGEMENT
PLANNING BOARD
ACADEMIC COUNCIL
VICE-CHANCELLOR
PRO-VICE-CHANCELLOR – Academic
PRO-VICE-CHANCELLOR – Admin. & Planning
ACADEMIC COORDINATION & SCHOOLS OF STUDIES
DIRECTORS (DEANS) OF SCHOOLS
DISTANCE EDUCATION
DIRECTOR
COMMUNICATIONS
DIRECTOR
COMPUTER
DIRECTOR
REGISTRATION & STUDENT EVALUATION
DIRECTOR
LIBRARY & DOCUMENTATION
LIBRARIAN
REGIONAL SERVICES
DIRECTOR
MATERIAL PRODUCTION & DISTRIBUTION
REGISTRAR
RECOGNITION & COORDINATION
DIRECTOR
PLANNING
DIRECTOR
ADMINISTRATION
REGISTRAR
FINANCE & ACCOUNTS
FINANCE OFFICER
ESTATE MANAGEMENT
DIRECTOR

structure of the Andhra Pradesh Open University is similar to the structure of other universities in the State. The Governor of the State is the Chancellor of the University. The Vice-Chancellor is the head of the University. The Executive Council and the Academic Council are the decision-making bodies. In India, there is no provision for the Chancellor in the Indira Gandhi National Open University and also there is no Court. Similarly, there is no Senate in the case of the Andhra Pradesh Open University. The management structure of the autonomous distance education institutions is similar to the management structure of the conventional universities of many countries because of the impact of conventional management systems on education and also because the framers of the legislation do not want too many innovations. This appears to be the case not only in Asia but also in other countries such as the UK and Canada.

In their work the autonomous distance education institutions are very different from their conventional counterparts. The requirements of their organization are different from those of the conventional system. Not only do the distance education institutions plan their academic programs, but they have also to produce the programs and deliver them to the students. The production is generally done centrally and is a massive operation. Further, there is the requirement of coordinating with the broadcasting institution and establishing the tutorial systems and study centers. Such work is organized quite differently from those of the conventional system. The organizational chart of the STOU refers to the offices of the Rector, Educational Services, Schools, Academics Affairs, Registration, Records and Evaluation, Documentation and Information and the University Press. The academic schools are similar to other schools (Chart III). In Pakistan, the organization consists of regional tutorial services, servicing operations, administration, etc. (Chart I). The organization of the University of the Air, Japan, comprises the University Management Committee, Faculty Council, Academic Production, Broadcast and General Affairs Department and their subdivisions (Chart V).

The management structures of the mixed institutions vary from country to country and within the country. In Australia, distance education is part of the conventional education system. The decision-making bodies in general management which are common to both off-campus and on-campus programs are shown in the organization chart of Deakin University (Chart VI). In the mixed institutions, management of distance education is the responsibility of the system as a whole. There may be one unit in the institution dealing with the off-campus programs but it is a part of the whole system. Distance education is intimately integrated with the structure of the University. In the case of

ORGANIZATIONAL CHART V
THE UNIVERSITY OF THE AIR, JAPAN

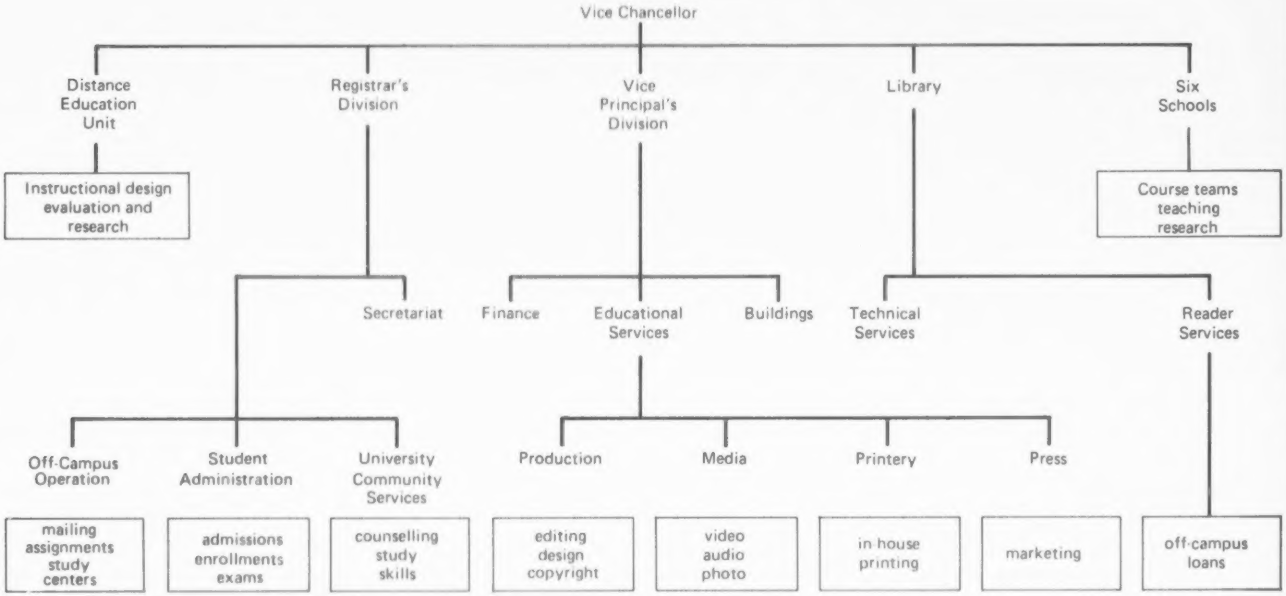

President
The University Management Committee
Auditor
President
Executive Director
Faculty Council
Director-General Secretariat
Vice President
Director, Kanagawa Study Center
Director, Tokyo (2) Study Center
Director, Tokyo (1) Study Center
Director, Chiba Study Center
Director, Saitama Study Center
Director, Gunma Study Center
Professors
Associate Professors
Visiting Professors Part-time Lecturers
Director, Production Department
Director, Broadcast Department
Director, Academic Department
Director, General Affairs Department
Deputy Director, Production Department
Head, Administrative Section
Head, Administrative Section
Head, Administrative Section
Head, Administrative Section
Head, Administrative Section
Head, Administrative Section
Program Directors
Program Director
Head, Technical Division
Head, Planning Administration Division
Head Library Division
Head Information Management Division
Head Study Center Division
Head Academic Counselling Division
Head Academic Division
Head Budgeting and Accounts Division
Head General Affairs Division

Source: Abe, Y., University of the Air, Paper presented at the International Seminar on Distance Education: Experiences of Open Universities, Indira Gandhi National Open University

ORGANIZATIONAL CHART VI

DEAKIN UNIVERSITY, AUSTRALIA

Integration of Distance Education with Other University Functions


Vice Chancellor
Distance Education Unit
Instructional design evaluation and research
Registrar's Division
Vice Principal's Division
Library
Six Schools
Course teams teaching research
Secretariat
Finance
Educational Services
Buildings
Technical Services
Reader Services
Off-Campus Operation
Student Administration
University Community Services
Production
Media
Printery
Press
mailing assignments study centers
admissions enrollments exams
counselling study skills
editing design copyright
video audio photo
in-house printing
marketing
off-campus loans

Source: Jevons, F., Distance Education in Mixed Institution Working Towards Parity, in *Evaluation of Higher Distance Education Results, op. cit.*

Deakin University, the head of the University is the Vice-Chancellor. The broad divisions of the University are the Distance Education Unit, the Registrar's Division, the Vice-Principal's Division, Library and the Schools. In India, about 30 universities provide correspondence education. The management system of these courses varies from university to university. In some, correspondence courses unit enjoys sufficient autonomy, but in others, they do not have the status even of a department of the University. Barring a few exceptions, the general impression about the management of mixed institutions in India is that they lack autonomy and freedom to design their own courses and they are adjuncts to the conventional system.

C. Monitoring

In view of the peculiarities in the distance education systems, monitoring has a very significant role to play in them. Distance education is a highly integrated system and there is close interrelatedness between the various subsystems and between the activities. Every activity has to be undertaken according to schedule. It is through monitoring that the management watches the performance of various subsystems in the institution. From the beginning the need and significance of monitoring has been realized and accepted in distance education. Though most distance education institutions undertake this function, the process varies from institution to institution. Some use sophisticated computer-based monitoring system, while others use manual systems.

Monitoring is undertaken in the fields of course creation, production and delivery, tutorial services, effectiveness of instructional media, students evaluation, etc. Their work is closely interrelated. For example, if there is a delay in course preparation, course production will suffer which in turn affects the delivery system. Without some form of monitoring, as B. Connors has noted, some students will be given wholly inappropriate tuition and some assessment results will be wholly suspect.[48] In the autonomous distance education institutions, although the need for monitoring and evaluation is well recognized, the system has not been institutionalized and both the functions are undertaken by evaluation and research units. For example, in the UT, Indonesia, it is undertaken by the Centre for Research. In AIOU, Pakistan, there is a data processing, research and statistical center. In STOU, Thailand, this function is undertaken by the evaluation section of the Office of Registration, Records and Evaluation. In the University of the Air, Japan, the General Affairs Division of the Department of General Affairs provides monitoring. In mixed institutions like the Deakin University, the Distance Education Unit undertakes this function. In India, this is the most neglected function and there has not been proper monitoring systems though distance education started almost two and a half decades ago. However, the systems for monitoring are better in autonomous institutions than in mixed institutions.

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[48] Connors, B., "Assessment in the Distance Education Situation," in Kaye, A. and Rumble, G., *op. cit.*, pp. 172–173.

D. Problems of Adequacy

Management systems of distance teaching universities in the region are carefully designed, though they represent a blend of innovation and tradition. The systems are adequate so far as governance, courses and student systems are concerned, but inadequate in the case of monitoring, evaluation and research, except in STOU. Mixed institutions, on the other hand, present a mixed picture of adequacy and inadequacy. In Australia, as there was careful planning, management structures were adequate; whereas in India, due to the absence of proper planning before the establishment of correspondence institutions, they suffer from several maladies. The management systems in autonomous institutions enjoy freedom and autonomy to undertake the activities keeping in view the requirements. They can introduce innovations in the educational pattern. For example, instead of conventional departmental system the IGNOU has inter-disciplinary school system. The same is the case with other distance education institutions. They have the freedom to design different types of courses based on demand and surveys. More than anything else, the management systems and autonomous institutions strengthen distance education and enhance the status of distance education in the country.

But a major weakness of the management system is the tendency to adopt conventional patterns in the name of uniformity. As a result, the culture of conventional systems pervades distance education systems also which is not conducive to good work. Furthermore, the management of distance education institutions depend upon the other systems in the country. For example, the efficient delivery of course material is directly dependent on the postal system.

Monitoring and evaluation systems are generally inadequate both structurally and operationally. Because of this, proper evaluation of the system and consequent adjustments become very difficult. More important control and supervision becomes very difficult which in turn affects the progress of the system.

At the macro level, there is a realization of the relevance of distance education systems to meet the educational needs of society. But this does not percolate down the political and administrative systems resulting in a lack of clear perceptions about what the system can do and how the new system should be. At the micro level, as it is an innovation, experience and expertise are not easily available and in many cases not available within the country. As a result, realistic planning becomes difficult and the process of the establishment of the institution is conditioned by these limitations. Further, this new system has to operate within the overall framework of the existing institutions – both governmental and educational. The bureaucratic delays in the clearance of proposals and non-availability of academic resources or unwillingness on the part of academics to work with the new system are some of the problems which distance education institutions face in the initial stages. However, because of the educational needs in the country, these educational planners see the significance of distance education institutions. In India, during last year, several state governments have announced their intention to set up distance education institutions at school and tertiary levels. Similarly, Bangladesh proposes to have a full-fledged open university in the country. The reason for distance education systems in these countries is to reach large numbers of people and provide education to them at a comparatively lower cost.

BROAD INSTITUTIONAL PATTERN AND PLANNING PROCESS

There is a diversity of institutional patterns in distance education. Based on experience and looking into the needs of the distance education institutes, we present here a broad organizational structure appropriate for the implementation of distance education in the region.

A. Institutional Pattern

The organizational forms of distance education institutions, can be broadly grouped as autonomous and mixed or hybrid institutions. Autonomous types offer better alternatives especially in developing countries where the educational task is vast and where geographical factors and other societal aspirations make it imperative to adopt a very flexible and democratic approach.

B. Planning Process

As mentioned earlier, there are three stages of planning in distance education:

(i) Planning during the conceptual phase;
(ii) Planning during evolution and growth phase; and
(iii) Planning during maturity.

1. Planning During Conceptualization

Before a distance education institution is set up it is necessary to ask questions such as – why a distance education institution becomes necessary in a country? Who is to examine the feasibility and desirability for such an institution – a planning committee or an external consultancy? Who will take the decision to set up a distance education institution – (i) federal government or provincial government; (ii) university or an existing institution; and (iii) a private body? What is the time frame for setting up such an institution and what are the resources allocated? What are the objectives of distance education both in the short and long-term? Who will provide the funds during various phases? Who will be the collaborators? These are the questions around which the entire pre-project planning would revolve. In different situations, their relative importance may vary but answers to these questions would form the essential ingredients of planning.

2. Planning the Growth of the Distance Education Institution[49]

In this phase there are two major areas of planning first, at the launch of initial courses, and second, of the physical institution including the technological infrastructure and recruitment of intellectual resources. These two have to be integrated. For example, the availability of intellectual resource (internal or external) will determine the time taken in launching the courses. In Table 1 are listed some of the major planning tasks in both areas. In actual practice these planning activities are further broken into minute details for drawing flow charts. These charts are periodically modified to accommodate exigencies.

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[49] For detailed itemization, see Dodd, J., Appendix 1.

Table 1: PLANNING ACTIVITIES DURING EVOLUTIONARY & GROWTH PHASE

Key Areas of Achievement	Launching of Initial Courses	Development of Physical Institution
Schedule of Major Planning Activities (Not to Scale) (Time)		
End of 1st Year	1. Identification of Target Audience of Students (Entire Gamut of Admission Policy)	1. *Recruitment of Academics/Staff
	2. Course Creation	2. Construction, Installation and Commissioning of Studios
	3. Material Preparation (Academic & Physical)	3. Purchase, Installation and Commissioning
	4. Material Storage & Distribution	4. Construction of Office/Academic Blocks
End of 2nd Year	5. Media Back-up Planning	5. Architectural Competition and Planning Permanent Campus
	6. Admission of Students	
	7. Students Support Facilities	
	8. Library Support	

* These are only representative planning activities.

3. Planning During the Maturity Phase of the Distance Education Institutions

These tasks can be divided into two sections namely, the review of existing courses and the planning of new courses by way of diversification. Some courses have a life cycle and if they are no longer in demand the institution should withdraw.

Sometimes the educational institution may also diversify other activities such as starting open television transmission or marketing of educational cassettes. The feasibility of all such new ventures is measured in terms of synergies between existing operations and the new ones.

C. Organizational Structure for Implementation

In devising organizational structures appropriate for distance education, the following aspects need to be borne in mind:

(i) Distance education institutions have academic as well as industrial characters. The organizational structure must cater to both. But there is a possibility that such a situation may lead to friction because the cultures of these two units are different from each other;

(ii) Organizational structure should be such as to ensure sufficient autonomy to the distance education institution. There should be decision-making bodies within the distance education institution which have the authority to take all decisions relating to the system;

(iii) The various aspects of distance education work such as registration, records, evaluation, academic affairs educational technology, educational services, documentation information, finances and planning need to be organized as distinct units with operational freedom closely coordinated;

(iv) The academic work is to be done at the departmental and the school levels. Whether there should be discipline-based departments or not is a matter for the distance education institution to decide. It can be argued that most of the programs of distance education are inter-disciplinary in nature. Therefore, only the school set up would be useful in such situations; and

(v) For the distance education program to be strong, some face-to-face instruction needs to be provided. This would

> involve organizing Study Centers/Regional Centers which will provide facilities for face-to-face interaction between the tutor and students. Such centers need to be organized at convenient places. The tutors/counsellors have to be attached to these centers. In addition to tutorial facilities, the Study Centers should provide counselling, library and audiovisual facilities. For science and technology students, it is necessary to provide laboratory facilities.

Three organs for policy-making and management are suggested for proper planning and efficient implementation of distance education in the Bank's DMCs.

Firstly, a Planning Board should be constituted.[50] This should be a think tank for the university providing the necessary guidance to other organs of the university. It should play a key role both in academic and developmental activities. This Board consisting of outstanding academics and educational administrators in the country should take a holistic view of the university and advise and plan for proper development of the university. Such Boards exist in the open universities in India, Japan, Pakistan, UK, etc. Secondly, there should be an Executive Council which should be the principal governing body of the university. To bring to the university wisdom and experience from different walks of life it should consist of people of eminence in science and technology, education and industry and other sectors of development. It is very useful to include representatives of the Government and broadcasting agencies for better coordination. Thirdly, an Academic Council, should be the principal academic body exercising general supervision over academic policies, and regulative of academic standards in the university. It should consist of outstanding academics both from inside and outside the university.

Another important organ should be the Finance Committee. Matters relating to resource mobilization, both internally and externally, subventions and subsidies from the Government, fee structure, expenditure control, etc. must be the function of this high level Committee.

The head of the institution should be the formal head exercising certain formal powers. He can be (i) *ex-officio* as in the case of India and Pakistan, or (ii) elected as in UK Open University, or (iii) appointed by the head of the State as in Thailand. Not being directly involved in the day-to-day operations of the institution, he can be of great help to the university by giving advice to the executive head of the university.

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[50] See Organization Chart VII.

The nomenclature of the chief executive of the distance education institutions should conform to the pattern existing in the conventional system whether it is the Vice-Chancellor or the Rector or the President.[51] This establishes parity and equivalence with similar institutions in the formal sector. But what is significant is that the nature of functions and the role to be played by the chief executive varies in a distance education institution. The multiple subsystems and organizational and management processes make it imperative for the chief executive to play an effective role in coordination apart from his traditional administrative, financial and academic functions. The nature of assistance that is provided to him in a distance education institution is also important. In distance education institutions he should have three to four deputies assisting him, each looking after a significant sector of the activities in the university, viz. academic, student services, planning and development, etc. In fact, such an arrangement is a functional imperative.

Below the level of chief executive, strategy should be to create three different types of agencies, viz. academic schools, auxillary agencies looking after common services like finance and administration and specialist divisions like educational technology, computers, production units, etc. These divisions should be responsible for administrative, evaluation, monitoring and controlling functions. The broad pattern is presented in the Chart VII. The nomenclature of the heads of these divisions and schools should be different from the conventional system; they should be designated as Directors as they have both academic and administrative functions. These Directors, to be effective, should have considerable autonomy. In case of schools the question arises whether there should be departments within a school or the school should be constituted as multidisciplinary academic division. The strategy should be to make optimum utilization of resources available in each school to develop inter-disciplinary academic programs. Any further division into departments will result in fragmentation of academic units as in a conventional mold and nullifies the very purpose of establishing schools as multi disciplinary academic units. Therefore the advantage lies in not dividing them into departments.

The jurisdiction of the open universities in almost all countries is the entire nation (or the province as in the case of the Andhra Pradesh Open University, India). With this vast jurisdiction there is need for establishing regional and local centers to implement distance education and provide strong support to students.

In this context, two patterns are suggested, viz. decentralized and

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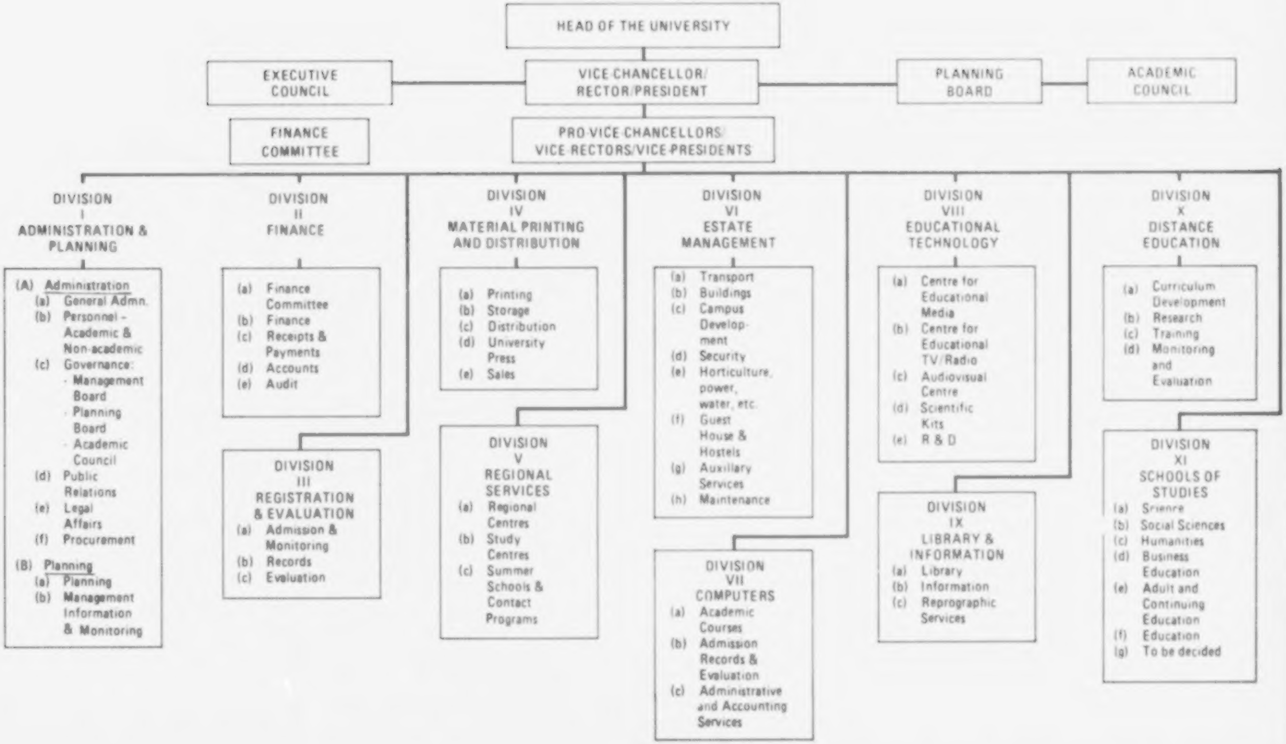
[51] See Chart, VII.

CHART VII
MODEL ORGANIZATION CHART


HEAD OF THE UNIVERSITY
EXECUTIVE COUNCIL
VICE-CHANCELLOR/ RECTOR/PRESIDENT
PLANNING BOARD
ACADEMIC COUNCIL
FINANCE COMMITTEE
PRO-VICE-CHANCELLORS/ VICE-RECTORS/VICE-PRESIDENTS
DIVISION I ADMINISTRATION & PLANNING
(A) Administration
(a) General Admn.
(b) Personnel - Academic & Non-academic
(c) Governance: - Management Board - Planning Board - Academic Council
(d) Public Relations
(e) Legal Affairs
(f) Procurement
(B) Planning
(a) Planning
(b) Management Information & Monitoring
DIVISION II FINANCE
(a) Finance Committee
(b) Finance
(c) Receipts & Payments
(d) Accounts
(e) Audit
DIVISION III REGISTRATION & EVALUATION
(a) Admission & Monitoring
(b) Records
(c) Evaluation
DIVISION IV MATERIAL PRINTING AND DISTRIBUTION
(a) Printing
(b) Storage
(c) Distribution
(d) University Press
(e) Sales
DIVISION V REGIONAL SERVICES
(a) Regional Centres
(b) Study Centres
(c) Summer Schools & Contact Programs
DIVISION VI ESTATE MANAGEMENT
(a) Transport
(b) Buildings
(c) Campus Development
(d) Security
(e) Horticulture, power, water, etc.
(f) Guest House & Hostels
(g) Auxillary Services
(h) Maintenance
DIVISION VII COMPUTERS
(a) Academic Courses
(b) Admission Records & Evaluation
(c) Administrative and Accounting Services
DIVISION VIII EDUCATIONAL TECHNOLOGY
(a) Centre for Educational Media
(b) Centre for Educational TV/Radio
(c) Audiovisual Centre
(d) Scientific Kits
(e) R & D
DIVISION IX LIBRARY & INFORMATION
(a) Library
(b) Information
(c) Reprographic Services
DIVISION X DISTANCE EDUCATION
(a) Curriculum Development
(b) Research
(c) Training
(d) Monitoring and Evaluation
DIVISION XI SCHOOLS OF STUDIES
(a) Science
(b) Social Sciences
(c) Humanities
(d) Business Education
(e) Adult and Continuing Education
(f) Education
(g) To be decided

centralized. In a decentralized pattern (as in UKUO) there is the advantage of certain administrative functions such as recruitment of tutors and counsellors, admission of students, maintenance of records, organizing summer schools, maintenance of liaison with local educational institutions, some aspects of monitoring and evaluation can be entrusted to the regional centers. It also has the advantage of close and constant supervision and control over the implementation process. The problem, however, would be of an enormous administrative organization that needs to be set up and its consequent costs. Alternatively, there is a centralized pattern as in STOU. In this, the responsibility of the central organization increases and based on monitoring and evaluation, changes in the policies and structures can be easily effected. But centralization demands high technology based monitoring systems which are equally expensive. Another major disadvantage is that regional centers become mere post offices without any responsibility for implementation of distance education. The former has advantages for institutions with smaller jurisdiction and the latter is advantageous for the institutions which have very large jurisdiction. What is relevant is that the regional centers must be effectively involved in planning and evaluation, based on which the strategies for the development of distance education can be altered, revised and new strategies evolved.

Provision for study centers is an important feature of distance education systems. The major functions of these study centers would be to provide tutorial services, library and laboratory facilities and counselling and guidance. The principle should be to locate such study centers in an existing academic institution thereby making use of the existing resources – both academic and infrastructural. Apart from reducing the botheration of establishing and consequently supervising and controlling, this makes available ready-made resources for instant adoption by distance education systems. The working of these study centers should be constantly watched and supervised. In the Bank's DMCs where resources are scarce, the proposed pattern will avoid duplication of efforts and wastage of scarce resources by making use of the existing infrastructure.

For purposes of implementation, the proposed pattern can be understood from a systems point of view. As indicated earlier, a distance education system is composed of three subsystem; operating, logistical and regulatory (see Table 2).

To begin with it may be difficult to achieve systems balancing of all activities and responsibilities. Purely from an experimentation point of view, a structure as shown in Table 2 can be evolved which may permit vertical coordination of tasks and also promote horizontal initiative of various functionaries.

Table 2: OPERATING, LOGISTIC AND REGULATORY SUB-SYSTEMS

Organizing Components Sub-System	Determination & Divisionalization of Activities	Allocation of Activities as Assignable Responsibility	Delegation of Authority
Operating	School of Studies	Director	Commensurate with Responsibility Administrative and Financial
	Regional Services	-do-	
	Material Production (Academic & Physical)	-do-	
	Material Distribution	-do-	
	Registration and Evaluation	-do-	
Logistics	Manpower Development and Training	-do-	
	Printing Press	-do-	
	Studios and Communication Facilities	-do-	
	Building other Physical Facilities	-do-	
	Computer and Data Processing	-do-	
	Maintenance and other Support Services	-do-	
Regulatory	General Administration	VC, PVCs Registrar	
	Governance		
	Planning, Monitoring Coordinations MIS	Director	
	Financial & Budgetary Regulation	Finance Officer	

D. Monitoring

Monitoring in distance education institutions in the region, as we have seen elsewhere, is not effective nor do institutional arrangements exist for regular monitoring. Unless feedback mechanisms exist, it is impossible to implement distance education programs effectively in the Bank's DMCs. Therefore, monitoring and evaluation units must be an integral part of open university's organizational structure.

The strategy should be to identify the key factors. Normally monitoring takes place only in cases where data is available and can easily be collected, or attention is focused on different aspects of output rather than the activities themselves. This is an important aspect of monitoring but it must be remembered that institutions are coming up not only out of the social and cultural considerations but also out of the political factors in this region. As a result, the designing and planning of a monitoring system is related to social, political and financial agencies. In the conceptual stage it is emphasized that the managers of distance education universities should address themselves to eight types of questions and these questions have alternative choices (see Table 3). It is difficult to be prescriptive in evolving a model of monitoring systems but a framework can be worked out which can lay foundations for evolving a monitoring model for a particular institution. It would be very desirable that monitoring and evaluation are directly kept under the charge of the Chief Executive of the university or the one immediately below him.

THE CREDIT SYSTEM

A credit system in distance education provides much needed flexibility to the student to pace his study.[52] It also gives him the free choice in subjects to pursue a course or a program of his liking. A credit system is designed to take into account the number of hours required to satisfactorily complete a course. Based on this, some courses carry full credits, others have half credits and even quarter credits. However, no uniformity exists in this field.[53] A student accumulates the number of credits based on his evaluation -- continuous assessment, end of the term assessment, project work and/or thesis to be submitted. Each course has a number of credits assigned and for each diploma or degree the number of credits are stipulated. Thus, a student who obtains his diploma or degree has to earn the required number of credits.

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[52] *Holmberg, B., Status and Trends of Distance Education*, Lund, Sweden, Lector Publishing, 1985, p. 137.

[53] Perry, W., *op. cit.*, pp. 152-160.

Table 3: DESIGNING MONITORING SYSTEM ALTERNATE CHOICES

QUESTION								
1. Why is it being planned?	o To evaluate the efficiency of of the strategy in terms of dominant goal	o To evaluate the effectiveness of the strategy in terms of beneficiary satisfaction	o To find out how consistent is the strategy with the environment	o To find out how consistent is the strategy with program dimensions	o Any Other			
2. What aspects will be covered?	o Quantitative results in short run o Quantitative results in long run o Any other	o Qualitative measure of beneficiary satisfaction o Beneficiary involvement o Any other	o Political factors o Economic factors o Social/Cultural factors o Any other	o Objectives o Resources o Structure o Policies o Processes o Human Components o Any other				
3. Who will be responsible for a. generating the information b. analysing the information	o Nodal Agency	o Associate Agency I	o Associate Agency II etc.	o Concerned Ministry	o Representatives of beneficiaries	o Representatives of suppliers of inputs	o Joint monitoring	o Any other
	Centralised				Decentralised			
4. How will the information be obtained?	o Structured formats	o Semi-structured reviews	o Periodic conferences	o Voluntary written feedback/complaints	o Verbal	o Secondary print sources	o Any other	
5. a. When will the information be obtained?	Need based			Regulatory				
b. How frequently will it be obtained?	Once a month	Once a quarter	Once a year	Once every two years	Any other			
6. a. Who will establish the accuracy of the information?	Nodal Agency	Joint Monitoring	Ministry	Any other				
b. How will be accuracy be established?	Random recheck	Fixed percentage basis	Any other					
7. Who will use the information for corrective actions?	Program leadership	Joint body of program functionnaries/beneficiaries	Ministry staff	Nodal Agency	Any other			
8. How much information, at what cost and how fast is to be obtained?	Determine the criticality of each of the area identified against question 1 in terms of program success. Use the principle: "Frequent, rapid information feedback on few critical parameters is more important than high volume, fast data on slow reacting variables"							

Source: Neck, P.A. and John, L.M., *Strategic Management of Small Enterprise Development – A Training Package*, International Labor Organization, Geneva, 1986 (under print), pp. 122-123.

A credit system enables the students to concentrate on one or two subjects at a time which in turn enables him to study it in depth. Similarly, this system, unlike the formal system, does not have any rigid limits of the subjects to be taken. To get a degree, a student can earn credits by studying different disciplines like management, engineering, computers, etc. This system provides scope for recurrent study and evaluation.

As a distance education system is generally organized in a modular form, credit systems provide facilities to the students to complete module after module according to his convenience and accumulate the credits until he gets a degree or diploma.

There is no uniformity in the operation of credit system or the required number of credits for a degree or diploma in the countries of the Region. For example, the STOU uses a semester system and allows its students 4-12 years to earn a degree. Courses are arranged in blocks to provide an integrated study of inter-related subjects.[54] Each block is worth six semester credits. A student may take six to ten credits each semester. A student gets a bachelor's degree if he accumulates 132 to 144 credits.

In AIOU, students must accumulate six credits for the award of intermediate certificate, eight credits for the B.A. degree and ten credits for M.A. degree.[55]

In KACU, a student should receive a total of 124 credits in stipulated areas to graduate from the university.[56] In TV Universities in China, also the credit system is in use.[57]

The credit system, though new in the educational systems in the Region, has the advantage of flexibility and, therefore, all distance education institutions must design and adopt it. The system should be so devised that it enables a student to transfer the credits from one non-formal system to another non-formal system and also from non-formal system to formal system and vice versa. This flexibility would enable students to move from one system to another without losing either time or cost while enabling them to capitalize on knowledge accumulated.

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[54] Srisa-an, W., *op. cit.*, p. 316.

[55] *Distance Education in Pakistan, op. cit.*, p. 5.

[56] Kown, S.C., Korea Air and Correspondence University, Paper presented at the International Seminar on Distance Education: Experience of Open Universities, *op. cit.*

[57] Yuhui, Z., *op. cit.*

EVALUATION

Evaluation in distance education has three different facets. Firstly, evaluation of students' performance; secondly, evaluation of the programs of distance education on a continuing basis; and thirdly, evaluation of the distance education system itself.[58] All the three kinds of evaluation are essential to keep the distance education institutions in a sound condition.

A. Student Evaluation

The purpose of student evaluation is to know how much knowledge the student has assimilated from time to time and at the end of the term. Most distance education institutions use continuous assessment end of term examination, evaluation by internal and external examiners, and marking or grading to determine students' level of performance.[59] In conventional system, there is direct contact between the teacher and the student, and the response system is continuous. But in distance education, this is not the case; students are spatially dispersed. There is no continuous contact between the teacher and the learner and response mechanisms are indirect. As a result, there is need for a different system of evaluation in distance education.

Unlike the formal system, the student is expected to complete a particular number of assignments during the term to be eligible to take the end of term or semester examination. These assignments are evaluated and evaluation sheets are sent to the student to enable him to know his progress and efficiency, and also to decide the future direction of his studies. To the teacher, it helps to know the progress that his students are making and to identify the common problems and to analyze the causes for such problems. Based on this, they can send supplementary material, if required. In the distance education system, detailed records are maintained about students' progress of study which help the students and teachers. The university gets continuous feedback about the progress, performance and pitfalls in study.

In evaluation, there are different methods like marking and grading. Marking is generally the method adopted in developing countries of Asia and the Pacific, this has several problems. In the first place, marking is made against the tutor's hypothetical ideal, and secondly, it is made against what the tutor perceives to be the distance education institution's ideals. As marking has high degree of subjectivity, in some countries the grading system is being followed. The grading system, here too, there is no uniformity and there are many variations. In some systems the grading is done from "A" to "F" and in others on a 20-point scale. In distance education institutions in Asia and the Pacific, both marking and grading systems are in vogue.

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[58] Holmberg, B., *Status and Trends of Distance Education, op. cit.*, pp. 110-122.
[59] Connors, B., "Assessment in the Distance Education Situation,"in Kaye, A. and Rumble, G., *op. cit.*

In the Allama Iqbal Open University (AIOU), Pakistan, home assignments constitute 40 per cent value and end of term examinations constitute 60 per cent.[60] In each course, a student is expected to get 33 per cent marks both in home assignments and final examination to pass. However, to pass the course in both, he must get an aggregate of 40 per cent marks. Student evaluation is undertaken by the Examination and Assessment Branch of the Operations Divisions.

In Sukhothai Thammathirat Open University (STOU), Thailand, students must undertake an assignment at the conclusion of each major topic and they are evaluated by the university tutor.[61] This component constitutes 20 per cent of the total evaluation. In this university, 4 grades are given and they are alphabetically called "H" (Honours), "S" (Satisfactory), "U" (Unsatisfactory) and "I" (Incomplete). To obtain "H" grade, one must score more than 76 per cent, for satisfactory (S), between 60-75 per cent; and for unsatisfactory (U), below 60 per cent. Another condition in grading is that to get first class honors a student should get honors grade in 3/4th of the courses of the program and should not receive any "U" grade in any course. Thus, rigorous criteria are prescribed in evaluating students' performance. In STOU, there is a strong Evaluation Section in the Office of Registration, Records and Evaluation which is in charge of examinations.

In Korea Air and Correspondence University (KACU), the students have to submit several reports on the assigned subjects. The results of these assignments are used for evaluation which consists of two parts, viz. objective tests and subjective tests. A student is awarded a B.A. degree if he completes courses of 140 or more credits.[62] In the University of Air, Japan, the evaluation is done course by course assignments and course examinations.[63] Only those who pass the "assignments" tests which is called "Guidance by Correspondence", are permitted to take the end of the semester examination to determine their credits. University of Air follows grading system A+ A, B, C, D and E. Only those who get A+to C are considered pass students.

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[60] *Allana, G.A., op. cit.*
[61] *Srisa-an, W., op. cit.*
[62] *Kwon, S.C., op. cit.*
[63] *Abe, Y., op. cit.*

In the Universitas Terbuka, Indonesia, students have to take unit tests at the end of the semester examination.[64] Unit tests and semester examinations are given 30:70 weightages. Students are given grades A, B, C, D and E, or 4, 3, 2 and 1. In CRTVU, China, evaluation is mainly through examinations held at the end of each semester.[65] For the courses offered by the CRTVU, the question papers and the marking schemes are prepared together by the CRTVU. Such examinations are held on the same date throughout the country. Provincial TV universities are responsible for the organization of the examinations and the marking of papers afterwards.

In India, as the distance education institutions are part of the formal system, they adopt the methods of marking as in the parent system. Though assignments are given, they do not carry any weightage in determining the final grade. In Andhra Pradesh Open University (APOU), the first autonomous distance education institution in the country, assignments constitute an important segment of continuous evaluation, but are not counted to determine the grade. Even this university adopts the marking system. The Indira Gandhi National Open University (IGNOU) established in 1985, proposes to have final grade based on both continuous assessment and final examination.

The conduct of examinations throughout the country poses serious organizational problems as proper arrangements need to be made. Two other important factors to be kept in mind are that evaluation should be reliable and the evaluators should be provided with a basis for marks. Another important factor is that continuous evaluation through home assignments should be an important feature of the distance education system. There is a need to develop exercises and other tests to ensure reliability in evaluation so that they are scientifically valid. It should also provide a reliable feedback to the student to assess his own progress in studies.

B. Formative Evaluation

The second type of evaluation – called formative or process evaluation – is undertaken to review the working of a program so as to bring about changes, if needed.[66] This helps to shape the program properly. This also enables the managers of distance education to monitor the progress of various programs. In this type of evaluation such questions like how the students use the services of the university, what difficulties they face in learning, are methods of teaching effective, and issues like dropout rate, effectiveness of instructional media, turn around time of student assignments, costing aspects of production, etc. are examined in detail. It concentrates on all the broad aspects of the distance education system like course preparation, delivery system, student support system, instructional system, etc. The scope of evaluation would be scheduling of activities, resource utilization, role and function of staff, control mechanisms, etc. Formative evaluation is an ongoing investigation into the process and methods of ascertaining the needs and problems of the participants in the educational system. The techniques for formulating the program on the basis of problems and needs and preparation of teaching materials and pre-testing and finalization also form part of it.

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[64] Suparman, *op. cit.*

[65] Yuhui, Z., *op. cit.*

[66] Holmberg, B., *Status and Trends of Distance Education*, *op. cit.*

There is need for continuous evaluation of each of the programs undertaken by the distance teaching institution. Such an evaluation affects the total system. Surveys may have to be undertaken to ascertain the needs and requirements of prospective students to enable the institution to plan its academic programs. Evaluation of different segments of university systems like audio material, broadcast material, tutorial services, scientific kits supplied, etc. should be undertaken on a continuous basis. This is basically a part of the development work of the distance education system. For example, the STOU undertook a survey to understand the causes for high dropout rate in different programs. Based on such surveys, it rectified the problems and improved its various sub-systems. As a result, dropout rates decreased in the subsequent years.[67]

C. Summative Evaluation

Assessing the results of internal systems is a third stage of evaluation which a distance education institution should undertake. This kind of evaluation is often called "summative evaluation".[68] The main purpose is to see how distance education is working. Such an evaluation goes far beyond the examination of students and material. It is most important, difficult and seldom undertaken. This appraisal is generally concerned with the quality of learning material effectiveness of distance education in general, suitability of distance methods for different disciplines and subjects, etc.

For evaluating the open university systems, several criteria have been laid down by different authors.[69] Of the different approaches to it, we find Rumble's approach useful for our purpose.[70] He gives four levels of analysis to measure the effectiveness of the open university system. They are:

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[67] Srisa-an, W., *op cit.*
[68] Holmberg, B., *Status and Trends of Distance Education*, *op. cit.*

(i) The response time test; how long does it take to produce a graduate;
(ii) The output and input ratio; the number of graduates in proportion to the number of students admitted;
(iii) The correctness of output; does it correspond to the system's goals, needs and demands of the community and students; and
(iv) Cost-efficiency and cost-effectiveness.

Keegan and Rumble suggest that in an open university, evaluation should be focused on the quality of learning achieved, the quantity of learning achieved, the status of learning achieved and the relative cost of learning achieved. These cover all the aspects of the system and therefore are useful for summative evaluation.

Different methods are adopted for formative and summative evaluations. First is budgetary control. Second is Program Evaluation and Review Technique and Critical Path Method. This enables everyone to know the progress or the results of work at periodical intervals and also at the end of the completion of the programs. Such evaluation should be against the backdrop of objectives of the distance education institute like equality of opportunity, quality of the programs offered, learner attitudes, cost benefit analysis, etc.

In STOU, Thailand, there are research sections in the office of Educational Technology, in the Office of Academic Affairs and also in the Office of the Registration and Evaluation. This is indicative of the importance attached to research and evaluation in the open university system in Thailand. In AIOU, Pakistan, research is undertaken on a continuous basis on various aspects of its working. In KACU, South Korea, the Institute of Distance Education is responsible for evaluation to guide and improve the educational program. Similarly, most other open universities have full-fledged research and evaluation divisions which undertake both formative and summative evaluations apart from student evaluation.

In India, the IGNOU Act stipulates that every Statute, Ordinance or Regulation made must be placed before each House of Parliament.

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[69] N. McIntosh, lists nine major areas of concern for evaluation and D. Gooler, lists seven criteria for evaluation. See Keegan, D., *Foundations of Distance Education*, *op. cit.*, pp. 242-245.

[70] Rumble, G., Evaluating Autonomous Multi-Media Distance Learning Systems: A Practical Approach, *Distance Education*, Vol. 2, No. 1, 1981, pp. 64-90.

This is intended to monitor and evaluate the progress and performance of the university by the highest policy-making body. Further it is the responsibility of the IGNOU to see that other distance education institutions maintain academic standards. The university is also contemplating a strong research and evaluation wing to undertake both formative and summative evaluations.

D. Agency for Evaluation

It is not enough to accept the significance of evaluation in distance education. Equally important is, which agency should conduct evaluations? Should there be a separate evaluation agency? Or should it be a part of each of the component units of the distance education institution? Both have advantages and disadvantages. An independent wing has the advantage of developing skills and can maintain a [balance between involvement and detachment] which will add credibility to the results of evaluation. Quite often, it is suggested that evaluation agency must be outside the distance education institution to bring more objectivity and to safeguard against the subjectivity of the inside evaluators. But the argument which goes against outside agency is that it gives a spurious air of respectability without any real benefit to the institution; the outside agency has little or no experience in distance education systems.

As we have seen, most of the distance education institutions have established evaluation and research cells; in some, they are strong as in STOU, and in others, they are weak, and in a few, they do not exist as in APOU. Though many distance education institutions have evaluation and research units, they do no more than to collect data that is sent to them. Evaluation is not being used for strengthening the systems nor those who manage the evaluation systems have the capabilities to do so. Though in form some kind of evaluation system exists, both in structures and substance they are very weak in most distance education institutions. It is in this area that the external agencies like ADB can help to create the systems and even help train the personnel.

E. Evaluation Strategies

Evaluation systems in the Bank's DMCs are not strong. As a matter of fact, there have not been proper institutional arrangements for evaluation even in the formal systems. The system is ineffective and the reforms are very slow and halting. In distance education institutions, such halting efforts at reform would cause serious drawbacks and affect their credibility. The grading system would be more suitable in distance education systems than the marking. But many academics, both in the distance education systems and the formal systems, are not familiar with the grading system and they resist it because of unfamiliarity. Therefore, there is a need for training to familiarize the academics with the grading systems. The Bank can play a very significant role in pooling the expertise available and providing training facilities in the new system of student evaluation.

Evaluating the impact and processes of distance education are equally important. In some countries, it is unfortunate that even after two decades after the introduction of distance education, no formal studies of its impact were undertaken resulting in their improper functioning, deterioration in standards and criticisms both by the academics as well as others. In distance education autonomous institutions much euphoria is generated and many expectations are raised. If the system is not to degenerate, there is a need for proper evaluation of the impact of distance education. This should be done in terms of objectives for which these institutions were created. The Bank can undertake periodical and independent evaluations in Asia and the Pacific and recommend both preventive as well as curative measures. For this, collaborative efforts between the international organizations like UNESCO and the Bank will be fruitful.

F. Database

No sound evaluation and monitoring is possible without scientific data. In distance education not only is scientific data needed but it should also be readily available. Data has to be collected, processed, analyzed and articulated to provide a basis for the policy-makers, administrators and users to revise or change a part of the system or program or the whole program itself, if necessary. Techniques like surveys, observation, interviews, test checks, periodic inspections and reviews are used to gather data. Letters received from students and reports of tutors are also useful in this respect. Choice of a particular technique should be determined based on advantages and disadvantages in terms of speed, cost and accuracy. The regional centers and study centers of the distance education institutions should be effectively used to collect the data needed.

In the region, database is very weak and, therefore, they have not been able to analyze the strengths and weakness and revise the activities as well as structures. In autonomous institutions of distance education, database is comparatively more systematic when compared to the mixed institutions. If monitoring and evaluation are to be meaningful, database must be perfect. This is a problem confronting all the distance education institutions. ADB can devise systematic procedures for database and train the personnel in managing data systems.

TRAINING FOR DISTANCE EDUCATION

Training in the context of distance education has two facets. Firstly, offering courses to train personnel to meet shortages in different areas as part of its academic programs. Secondly, training personnel engaged in distance education itself in the methodologies of the new system. The former involves organizing different programs like teacher training to meet the growing requirements of the educational system. In several countries, institutions of distance education offer such training programs; like any other academic program, it is to meet the requirements of trained teachers at primary and secondary levels. The latter is concerned with personnel who are directly or indirectly involved in the work of distance education. In this paper, the focus is on the second category.

Distance education, even where it is organized autonomously depends upon the formal system in more ways than one. For example, in several distance teaching institutions, preparation of course material, audio and video lessons and tutorial services are undertaken by the academics from the formal system. But, distance education has not found favor with the academics of the formal system, who think that it is weak both conceptually as well as operationally. They not only undervalue the system but are even skeptical of the nature and potential of distance education. Since distance education cannot totally avoid its dependence upon the academics of the formal system, it becomes imperative to provide training to such academics before they are inducted into the institutions of distance education. New recruits also need to be exposed to the characteristics of this system. All such academics have to unlearn several concepts of education and must be inducted into the new ethos of team work and new methodologies of education, technologies of instructional media, etc. It is in this context that training becomes not only relevant but imperative in distance education systems.

A large number and variety of functionaries are engaged for different operations of distance education.[71] They are policy-makers and planners, administrators, subject-matter specialists, curriculum designers, course coordinators, tutor and counsellors, correspondence material writers, editors, writers of radio and TV scripts, educational technologists, radio and TV producers and presentors, evaluators, etc. They can broadly be grouped into four categories, viz. policy-makers and administrators; personnel engaged in production of correspondence material; personnel engaged in educational TV and radio; and the personnel engaged in student support services, like tutorial systems, counselling, etc. These different categories of people require different types of skills, viz. knowledge skills, executive skills, production skills, research skills, human relation skills, etc. Training programs must take into account all such requirements.

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[71] UNESCO Regional Office for Distance Education in Asia and the Pacific, Bangkok. *Training of Personnel in Distance Education*. Report of a Regional Seminar, 1983, p. 33. Also see other

The Bank's DMCs have either evolved or are evolving strategies to meet training needs. Nevertheless, the fact remains that the training structures are not strong and effective except in Thailand. For example, in India, despite the fact that at the tertiary level more than 30 universities are engaged in distance education, training is still at an ancient stage. Training institutions have not been created. It is only recently, with the establishment of IGNOU, that the responsibility of training all those who are engaged in distance education has been entrusted to it. In Malaysia, specialized teacher-training courses exist for distance educators. Training is in countries like Japan is through attachment of personnel.

In Nepal, there is a dearth of personnel and the priority is to train writers and self-learning material and for radio script writers. In Pakistan, which has a well-established open university, personnel are being trained through induction sessions, instructions to the writers, internship workshops, seminars and brief sessions for different categories of personnel, apart from sending personnel abroad for training. Pakistan has established linkages with the Open University of the United Kingdom, UNESCO Regional Office, Bangkok, and IIEP, Paris. Advance training requirements of personnel are being met by these external agencies. Still there is no well-developed training program in the country. In the Philippines, training of personnel involved in distance teaching is undertaken by Baguio Vocational School. This School, under its continuing Education of Teachers Program, trains personnel. It organizes workshops for writers of material and also training for managers and tutors. In the Republic of Korea, personnel of distance education

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UNESCO Regional Office publications like: *Distance Education in Higher Education*, op. *cit.*; *Regional Training Workshop on Development of Distance Education Instructional Materials*, 1985; *Distance Education in Asia and the Pacific - Bulletin*, December *1985*; *Distance Education: Exemplar Training Materials*, 1984; and *Distance Learning for Teacher Education*, 1982, Vol. 1 & 2.

institutions are trained through workshops and seminars. A few, however, are trained abroad. In Sri Lanka, the need for training was recognized and the training requirements are being met both internally and externally as they do not have any specialized institution for this purpose. Functionaries like editors, printing technicians, tutors, evaluators, etc. are being trained internally.[72]

The Sukhothai Thammatirat Open University (STOU) which is a premier institution in distance education not only in the country but also in the region has a well-developed university complex and provides facilities for training not only the personnel working in Thailand, but also in other countries in the Region. In collaboration with UNESCO's Regional Office, the University organizes a large number of training programs, seminars and workshops in which personnel from various countries participate.

From the foregoing description, it is clear that different countries in Asia and the Pacific have different institutional arrangements to train the personnel engaged in distance education. Some countries like Thailand have specialized institutions and arrangements for training whereas others have ad-hoc arrangements. In some, they are in an incubation stage whereas in others they are well developed and advanced. There is a need for appropriate strategies for making institutionalized arrangements for training personnel to effectively implement distance education in the Bank's DMCs. The strategy should be to have both short-term and long-term training. Short-term training should be imparted to course writers, tutors and counsellors, script writers, etc. Long-term training should be given to technical personnel and executive staff. Every country has to have a part of its organizational structure, a training institution, and develop expertise in different aspects of distance education to organize short-term programs locally. The countries in the region should also share expertise so developed to each other's advantages without investing scarce resources on experimentation. There is also a need to identify a nodal agency in Asia and the Pacific which will act as a clearing house to meet the training requirements. UNESCO Regional Office is playing some role in organizing seminars and workshops. Under the aegis of UNESCO, national workshops are being organized in different countries. But these are organized on an ad-hoc basis and the methodology has not been standardized nor the frequency. In view of the enormous expansion of distance education in the Region, there is need to expand the facilities.[73] ADB can play a very crucial and significant role in filling this gap.

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[72] *Training of Personnel in Distance Education, op. cit.* and *Distance Education in Asia and the Pacific, op. cit.*

[73] *Bangladesh: Sector Study on Education, op. cit.*, pp. 160-165; *Training for Personnel for Distance Education, op. cit.*; and *Distance Education in Higher Education, op. cit.*

ORIGINAL AIMS AND PROBLEMS ENCOUNTERED

Some autonomous distance teaching institutions face a number of problems in the early stages of planning. Firstly, they are not given sufficient time to plan. In the case of the Andhra Pradesh Open University, India, not much time was given to plan the programs of the university. This seems to have been the case in Indonesia also.[74] There are institutions where sufficient time has been given to planning, e.g. Thailand and Japan. Another problem is recruiting the qualified staff and training them in distance education. The designing and preparing the courses is no less easy. If courses are produced in a hurry, quality suffers. In addition, preparation of audio and video material also requires time. The most important problem facing the planners in the new institutions is making arrangements with radio and television authorities. This is a time-consuming process. The main concern of planning in these institutions is to see that high quality material is produced and distributed to the students. Making arrangements for study centers and recruiting staff for tutorials is also a difficult task. Experience shows that autonomous institutions are in comparatively better position to handle these problems than mixed institutions. The working of correspondence institutions do not have sufficient freedom to plan and implement their programs. Plans are thrust on them by the authorities of the university or they do not get sufficient time to plan. This need not be true in the case of all mixed distance education institutions as for example the Australian system. In the early stages the most difficult decisions are those regarding finance. In most new institutions finances are provided by the Government. In the initial stages, almost all the funds have been provided by the Government, even if eventually the institutions do get their own revenues through the fees paid by students and sale of publications. In India, it is the Central Government which is providing the finances to the Indira Gandhi National Open University. Only nominal revenues are expected by way of fees in the first few years. In Japan, government's contribution is about 86 per cent. STOU's example is different from others; almost 82 per cent of its income is from its own sources and its dependence on the Government is only about 18 per cent. But this is not borne out by the experiences of others. [75] While the issue of finances, we must refer to the feeling that exists in certain quarters that distance education institution do not need much money; they can be even made financially self-supporting. If high quality material is to be developed and strong support in the form of tutorials and study centers is to be provided, a large amount of money has to be granted by the Government. Some distance education institutions have faced financial difficulties resulting in problems in developing courses and providing equipment in the study centers. This was the case with Pakistan. All that one can say on this issue is that a good distance education institution is far more cost-effective than a good conventional system.

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[74] See Setijadi, *Distance Education in Indonesia*, see Country Paper on Indonesia Vol. 2.

[75] Srisa-an, W., *Financing and Cost-Effectiveness of Distance Education*, Presented at the Regional Seminar of Distance Education, November 26 to December 3, 1986. Also see his study entitled *Financing and Cost-Effectiveness of Distance Education* in this series.

In the countries of the region, the aim of distance education has been to provide access to education to all those who could not afford to go to the conventional system. While providing wider access, the objective has been to introduce flexibility and innovation in the system. In particular, the stress is on the high-quality education.

The most important problem encountered by these institutions is the reaction of the academics in the conventional institutions. They have generally been pessimistic about the educational material and the standards in these institutions. The usual reaction has been that high quality education cannot be provided by the distance education institutions. Good teaching, according to them, has to be only face-to-face. As a result, these institutions, from the beginning, encounter the problem of their credibility.

Another problem that confronts some of the new distance teaching institutions, particularly of autonomous type, is about their academic programs. What courses should they start first? When an open university or a school is newly established, there are too many expectations from it. As a result, the planners are at a loss with regard to priorities. If liberal education programs are started, there is the criticism that distance education institution is duplicating the programs of conventional system. On the other hand, if short-term continuing education programs (diploma) are started by an open university, the criticism is that it is not a function of the university and the open university is lowering its level.

In most countries, distance education is not only new but also a new type of system. Its requirements of work are different from those of the conventional system; it demands new attitudes and ethics of work. In other words, a totally different culture is required in these institutions. It is not easy to create such a culture; for most of the academics are drawn from the conventional system and they tend to bring the culture of their institutions into distance education. There is the problem of reorienting them from traditional educational practice with which they have been acquainted. "It can be a difficult task to transform them into enthusiasts for, and experts in, the new system."[76]

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[76] *Distance Education in Higher Education, op. cit.*

Shortage of trained manpower is another problem faced by several of these institutions. In developing countries, says the Report of the workshop organized by UNESCO Regional Office, there is already a shortage of well-qualified staff in conventional universities. With the establishment of another institution, the staff shortage problem becomes more serious and selection even more restricted.[77] In the case of distance education institutions, the task is doubly difficult. In certain areas, like production of audiovisual material, there are hardly any trained personnel available. The demand for technical personnel in this area has been very great and quite often the distance education institutions find it difficult to recruit personnel in this area. What is worse, they face a very stiff competition with private sector in this area. In China's CRTVU, "there is a general shortage of staff. There are not enough highly qualified academics . . . "[78] The Andhra Pradesh Open University is experiencing a dearth of people with expertise in distance education. The Indira Gandhi National Open University is encountering difficulties, for example, in recruiting people who can produce educational broadcast material.

Because of the shortage of trained personnel, most of the persons who are assigned the work of writing lessons do not know how to write for distance education students. "The 'lesson' still often resembles textbooks or lecture notes . . .", writes Ronald J. Carr about correspondence courses in India.[79] Quite a few of the writers do not submit the lessons in time. This in turn affects the entire schedule of printing and distribution of the material. The time available for sending learning material is very short, says Atwi Suparman, referring to the Indonesian experience.[80]

In the case of science students, there is the problem of providing facilities for their experiments. The broadcast back-up has been either inadequate or has not been of high quality. In China, correspondence students living in rural areas cannot obtain experimental kits directly from university, and experiments for those TV and correspondence students can only be done in the conventional universities and colleges.[81]

Some distance education institutions have faced financial difficulties resulting in problems in developing courses and providing equipment in the Study Centers. This was the case with Pakistan.

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[77] *Ibid.*

[78] Yuhui, Z., *op. cit.*

[79] Carr, R.J., "Correspondence Education in Indian Universities: A Change of Direction?", *Distance Education*, Vol. 4, No. 2, 1983. Also see Singh, B., *Correspondence Education in India*, India, National Council for Correspondence Education, 1978.

[80] Suparman, A., *op. cit.*

[81] Yuhui, Z., *op. cit.*

Postal facilities, particularly in far off areas, are not adequate in some countries. As a result, students receive correspondence material quite late. In Indonesia, not every student's address can be reached by postal service because of the uncertain or unreliable students' address as well as isolated location. To reach such address, a relatively longer time is needed.[82] Hence a relatively longer time is needed reach them. Most of the people in the Region do not have access to television and audio videocassettes. Hence, their dependence on study centers increase.

Multi-lingual societies like India and Sri Lanka face the problem of language. In these countries the course material is to be provided in more than one language. For instance, in Sri Lanka, courses are generally written in English and are translated into Sinhalese and Tamil. Similarly, in India, the Indira Gandhi National Open University has to provide the course material in English and Hindi. Quite a few State Open Universities will have to produce the material in English and local languages. The Andhra Pradesh Open University is producing its course material in both English and Telugu. Translation becomes yet another requirement.

There is also the problem of broadcast (radio and television) reaching only a limited area. In some cases, the reception of signals is poor in remote and mountainous regions of a country. Broadcast time is not convenient to students. In Andhra Pradesh, students were facing difficulty with regard to the timing of the radio lessons. Similarly, in China, quite a few courses are offered during the day time, which is not convenient to most employed persons.[83]

Several distance education institutions do not have their own studios, laboratories and printing shops. Equipment for modern administration is still in short supply. This is the problem being faced by CRTVU in China and Andhra Pradesh Open University in India.[84]

There are instances of distance education institutions of the mixed type facing problems because of policies and attitudes of their own university. The correspondence-courses run by the conventional universities in India experience these difficulties. The persons working in correspondence-course institutions have a low morale and there is hardly any research support to them. The university authorities feel that the correspondence-courses are an adjunct to the formal system. The correspondence course institutes are treated as second-rate institutions. There is the view that the correspondence education should be self-supporting financially; they are expected to pay for themselves. Whatever revenues they generate go into the general revenues of the university. Even with regard to student services, the correspondence institutions are not treated on par with the conventional system. For instance, the concession which are available to the regular students by way of scholarships are not available to the students of the correspondence courses. The status of the correspondence institutions has been very low in most universities. They do not enjoy the status even of a department, not to speak of an autonomous college. As a result, the position of the head of the correspondence institution suffers. What is worse, several of the correspondence institutions do not have full-time academic staff.

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[82] Suparman, A., *op. cit.*
[83] Yu Xu, "A look Into Some Aspects of Distance Education in the People's Republic of China," *Distance Education*, Vol. 7 No. 1, 1986.
[84] Yuhui, Z., *op. cit.*

Despite these problems, awareness is growing that distance education has an important role to play in widening access to education. Their credibility is improving, thanks to the success of open university in the North and the South.

REVIEW AND RECOMMENDATIONS

Distance education is a complex and complicated system which requires detailed and systematic conceptualization, planning and implementation and evaluation. We have analyzed distance education systems in Asia and the Pacific with special reference to planning, management, evaluation and training with a view to strengthening the system in the Bank's DMCs.

The major limitation in attempting a paper of this type is the paucity of literature on the subject in the Region. This is understandable because distance education itself, as it exists in the present form, is of recent origin. We have, therefore, depended upon the inadequate data available and on our own understanding and experience in planning and implementing two distance education systems in Indian subcontinent.

A. Review

Several problems have been identified in planning the distance education systems in the countries covered by the Bank. The establishment of distance education systems must be preceded by detailed feasibility studies, But we observe that not all distance education institutions were established after careful planning. In some others, absence of adequate data base made the initial planning difficult. Then there was the non-availability of people with expertise in distance education to serve on the planning panels. To top these limitations were the pressures to start the programs early. All these have their own impact on the planning process.

Management systems, particularly of the mixed type, barring a few exceptions are too feeble to meet the specific requirements of distance education. This makes their structure and processes fall into the conventional mode rendering it inadequate to meet the demands of the new system.

Monitoring and evaluation systems exist, but in most of the distance education institutions in the Region, they are not strong enough. Even in autonomous institutions, they are not adequate. In mixed institutions, e.g. India, the systems are by and large absent. There are variations in methods of students evaluation and the task is to evolve a suitable system keeping in view the learner's environment. It helps to assess the progress of the students and the institution to assess the knowledge assimilated by them. Evaluation methods are not sufficiently designed raising problems both of reliability and credibility. Data base is comparatively weak and monitoring is not effective. The immediate consequence is the difficulty in identifying the strengths and weaknesses of different subsystems.

In most countries, distance education institutions have adopted the credit system, but in the formal system it is not common. This poses problems of parity and equality. Moreover, the credit system has not been properly structured which makes its operation difficult. Existence of two different systems in the same country makes transfer from one to the other almost impossible.

Training in distance education in the Region is not exhaustive. Most countries attend only to specific problems like training the scriptwriters and the overall context of distance education is ignored. Administrators, planners, evaluators and tutors do not get proper training to equip them to the new ethos of distance education and impart new skills and knowledge required to operate the system.

There are other problems also which distance education institutions face in the Region. For example, there is the issue of parity of esteem. Distance education is still not considered to be at par with conventional system. But in the years to come, this stigma will disappear provided those in charge of distance education maintain a high quality of instruction. In these countries, there is a shortage of expertise needed for devising and producing distance education programs. It is more so in the DMCs of the Bank. Conscious efforts have to be made to build up the needed expertise. Distance education, no doubt, provides economies of scale, but if there is fragmentation and there are too many institutions in a country providing distance education, it leads to duplication and wastage. A good example of this is Australia. This needs to be carefully examined.

The choice of media and technology has to be made by looking at the stage of technological development of the country. Hasty use of technology will produce more problems than solving them. For obvious reasons, telephone cannot be used for distance education in some of the countries of the Bank. In these new type of institutions, it is possible that conflicts might arise between the staff in the distance education institution itself particularly between those who are recruited from the mainstream universities and those who are attracted by distance education's commitment to innovation in "instructional development and design". The former emphasize "the importance of research and academic credibility over the desire to be innovative".[85]

Generally, most people who are recruited in distance education institutions come from existing institutions-academic and non-academic. These people bring along with them the culture of these institutions which is disfunctional to the working of distance education institutions. institutions.

In view of the advantages of distance education, there is a temptation for educational planners and administrators to think that it can be established without much effort and planning. There seem to be any misgivings about distance education: that it does not need any financial investment, and that it can be set up quickly. On both of these, they need to be educated.

B. Recommendations

Distance education is being looked upon as a system which can take education to the doorsteps of the students who are scattered on account of geographical distances, or for other reasons, cannot avail themselves of educational facilities. "Democratization of higher education can be more fully achieved using the model in that education is brought directly into the home."[86]

Distance education needs to be planned and implemented with 'care and caution'. Planning, both before and after the establishment of a distance education institution, must be undertaken with adequate time and resources. Conventional universities interested in introducing distance education programs should not do it blindly. The model organization chart as given in this paper should broadly guide the establishment of desired structures for an autonomous distance education institution. Monitoring and evaluation units must become part of distance education systems from the start. Training as an input for development of knowledge and skills must be recognized from the beginning and short-term and long-term plans prepared. Academic staff, administrators, tutors and evaluators as well as technical personnel have to be given proper training. Establishment of a nodal agency to act as a clearing house and sharing of experiences between countries will go a long way in strengthening distance education systems in the Region. The Bank can play a significant role in this area. Distance education institutions must have a provision for decennial evaluation of their system. Efficient monitoring and evaluation depend upon scientific data base. Computer systems must be installed from the beginning to take care of this work. Credit system, doubtless, should be an integral part of the distance education system to enable the students to study at their own convenience and time. But credit system in its totality must be formulated at the very beginning and the number of credits for different degrees decided in advance.

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[85] Mugridge, I., and Kaufman, D., *op. cit.*, p. 13.

[86] *Distance Education in Higher Education, op. cit.*, p. 2.

One of the important tasks that distance learning institutions in developing countries have to undertake from the outset is that of creating new attitudes and values. In other words, academics should undergo a kind of conversion of the soul to become a new breed of academics favorably disposed to the distance learning system. The need is to retrain them to adopt to the culture of distance education.

Talking of the relevance of distance education the world over in future, John Daniel says that there are three common trends. The first throws a continuing problem of access to post-secondary education – broadly for those in rural areas and those who are employed. Second, there is the case of adults who missed the first chance at education or who require new skills and knowledge to cope with the challenging environment. finally, there is the need to teach new subjects – computing is an obvious example – to huge number of people.[87] Thus distance education can be used to provide school education and tertiary education, liberal education and technical education, adult education and continuing education, teacher training and training of education administrators.[88] Distance education, therefore, has the potential of transcending the barriers of geography and time.[89] With the availability of modern technologies its potential has become even stronger. Radio, television, satellite, micro-computers, audio and videocassettes, videodisc and video text can be put to effective use in distance education. However, their choice has to be made keeping in view the technological development of a country.[90]

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[87] Daniel, J.S., "Future of Distance Teaching Universities in the Worldwide Perspective," in *Evaluation of Higher Distance Education Results, op. cit.*

[88] Sharma, M., *op. cit.*, pp. 11-16.

[89] Srisa-an, W., "Distance Education through Multi Media," *Distance Education*, STOU, 1986.

C. Fixing Priorities and Need for External Assistance

The agenda for promoting and strengthening distance education in these countries should concentrate on the following:

(i) Identify priorities in education – in particular, in distance education.
(ii) What should be the mix of multi-media?
(iii) Training of manpower – short-term and long-term training facilities within the country and outside the country.
(iv) Distance education institutions need huge investments initially for hardware and software and several of these countries are unable to provide the resources.
(v) Develop competencies for the use of new technologies.
(vi) Develop managerial competencies to man these institutions.
(vii) Provide a forum where the distance education institutions can meet and exchange ideas so that they avoid the mistakes committed by others. This forum can also identify areas of cooperation and collaboration for exchange of material and manpower.
(viii) Review the impact of distance education programs from time to time.

In all these the Bank has an important role to play. Among others, the important objectives of the Bank could be to develop human resources and the technical managerial competencies in its DMCs. "The participation of the Bank in distance education programs would enable the Bank to assist its DMCs, to provide wider access to educational opportunities, and thereby hasten economic and social development. In addition, it will help in achieving national goals for education, such as universalization, vocationalization and improvement of quality including standards of education.[91] Recently, Education Sector Studies of Nepal and Bangladesh undertaken by the Bank clearly emphasize the need for its involvement in these activities.[92]

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[90] See articles of Smith, R.C., and Gunatilake, P.D., on Impact of Communication Technology on Distance Learning in *Technological Innovation: University Roles*, *op. cit.*, pp. 352-364.

[91] Sharma, M., op. cit., p. 15.

[92] Bangladesh, *Educational Sector Study*, 1986, *op. cit.*

Appendix I
Page 1

PLANNING A DISTANCE EDUCATION SYSTEM

STUDENTS	Age	Minimum age for entry: Maximum age: restriction: Majority age range:
	Sex	male female
	Geographical distribution	where Regional quota? urban rural
	Educational entry conditions	Open entry: or restricted entry:
	Study time	Full time or part time: Study time available each week: (hours)
	Occupational groups	Occupation quotas?
	Lifestyles	Income (to pay fees): Housing (study environment): Possessions (TV, radio, cassette player, telephone, etc.): Transport (to attend local centers):
	Study motivations	e.g. vocational, educational, personal
	Student population	New entrants Year 1, Year 2, Year 3, Year 4
		Continuing Students
	Level	e.g. elementary, secondary, undergraduate, postgraduate, continuing education
	Purpose	e.g. functional vocational in service training and updating, educational:
	Number	How many different programs:
	Priorities	Which program(s) first:

Source. Dodd, J., as given in Keegan, D., *Distance Education, op. cit.* Also see Dodd, J., "Planning a New Distance Teaching University," *ICDE Bulletin*, Vol. 6, September 1984, pp. 21–31.

COURSES	Type	Traditional: Non traditional (e.g. multidisciplinary):	
	Levels	How many course levels in each program:	
	Number	How many courses at each level:	
	Student choice	What freedom of student choice:	
	Time	How many years for graduation:	
TEACHING YEAR	Structure	How many semesters: How many student weeks per semester:	
MEDIA	Range	Print, Broadcast, Non-broadcast	
	Mix	Print, Broadcast, Non-broadcast	
PRINTED	Academic creation	Who writes (e.g. on campus faculty: external authors): Where: When (time availability): How (single authors or course teams): Why (incentive):	
	Physical production	Where (on campus; off campus): How many copies initially:	
	Distribution	Method (post; road): Frequency (weekly; monthly): Destination (student home; local center):	
BROADCAST MEDIA	Television and Radio programmes	Allocation	All courses or only some courses
		Role	Supportive or new study information: Institutional:
		Production	Who produces: Where:
		Reception	Home-based or local-center-based:
NON-BROADCAST MEDIA	e.g. videotapes, audiocassettes, equipment for experiments	Allocation	All courses or only some some courses
		Role	Supportive or new study study information:
		Production	Who produces: Where:
		Reception	Home-based or local-center-based:

FACULTY SUPPORT	Availability of specialist staff support	e.g. text editors and designers: broadcasting personnel: audiovisual specialists: educational technologist: course administrators:
	Purposes	e.g. tuition and counselling: local study activities:
	Locations	Where:
	People	e.g. campus faculty: part time local staff:
ASSESSMENT	Type	e.g. oral, written
	Frequency	How often
	People	Who will assess
	Location	Where
EXAMINATION	Type	e.g. oral, written
	Frequency	How often
	People	Who will examine
	Location	Where
ADMINISTRATION	Who will be responsible for student and institutional administration	
MANAGEMENT	How will the faculty and other personnel be organized and managed	
FINANCE	Institutional	What finance is available in the first year and in subsequent years:
	Students	What fees will students pay
DATE OF OPENING	When will be first students be enrolled	

Hardware and Software in Distance Education

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INTRODUCTION

A. Communication Technologies in Asia and the Pacific

In the third programming cycle of APEID activities, the fifth Asia and the Pacific Seminar on Educational Technology[1] was held in September 1986 (i) to consider the development of distance and teacher education in primary and secondary education emphasizing computer education and the utilization of advanced technologies; (ii) to develop appropriate strategies; and (iii) to create databases on the above in order to meet the needs in Asian and Pacific countries. The status of advanced technologies in distance education was reported.

The following issues were clarified:

- (i) Educational technology would continue to play an increasingly important role in the delivery of educational services, particularly for those services provided at a distance.
- (ii) Unfortunately, there is often a lack of understanding of the meaning of educational technology as well as adequately trained personnel to implement programs.
- (iii) The educational use of new advanced technologies such as computers and the linking of such machines through communication networks often overshadow simpler and more direct means of communication.
- (iv) Extensive, detailed research is required to provide a sound foundation for good educational practice, although many studies worldwide are investigating the use of new advanced technologies for distance education.
- (v) The widespread use of any technology for the delivery of educational services depends on the quality of the infrastructure provided to support them.

Also, the UNESCO Regional Office for Education in Asia and the Pacific held a Working Group Meeting on the "Use of Advances in Communication Technologies for Higher Education Purposes" in June 1985, jointly with Sukhothai Thammathirat Open University, Thailand. [2] The report of the Meeting states that "Communication technologies are growing fast and many of them are becoming more and more pervasive and play an increasingly important role in education.

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[1] Japan National Commission for UNESCO, *Final Report of the Fifth Asian Seminar on Educational Technology in Tokyo*, September 1986.

[2] UNESCO ROEAP, *Working Group Meeting on the "Use of Advances in Communication Technologies for Higher Education Purposes,"* Thailand, June 1985.

They are being used as aids in classrooms, distance teaching, research, administration and for a variety of other purposes and are becoming increasingly indispensable. On the other hand, the problem is how best to utilize the new technologies in the service of more effective and efficient educational provisions."

The Meeting discussed (i) two aspects of the operations of higher education institutions: the teaching-learning process and the management, administration process; and showed (ii) the checklist on a flexible resource for course development and selection of appropriate media; and (iii) recommendations on the local and regional application of advanced communication technologies in Asian countries.

Moreover, one of the most important focuses in distance education in Asia and the Pacific is "Possibilities Offered by Advances in Communication Technologies" in the special issue of the Bulletin of the Regional Office for Education in Asia and the Pacific published in December 1985.[3]

It seems that UNESCO is interested in applying advanced technologies for promoting distance education in Asia and the Pacific. This is an important step, but the situation varies from country to country especially from the cultural, social, economic and political aspects. The possibility of access to advanced technologies would be increasing in the near future, but they are not always well-utilized in all Asian and Pacific countries at the moment. In some countries, traditional media would be more useful and effective than new media.

This report on "Hardware and Software in Distance Education" deals with the potential of advanced communication technologies as well as effectiveness of traditional communication technologies in distance education. However, problems on computer use in administration and management and educational use of satellite will be excluded because computer use in administration and management would be a universal problem in all kinds of educational institutions and not so specific to distance education. Satellite application would be discussed in more detail in another paper.

B. Related Documents on Hardware and Software in Distance Education

Many documents published by international agencies deal with various problems in distance education. Some are concerned with topics on the relationship between hardware, software and distance education in Asian and Pacific countries.

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[3] Adams, R.S., Bewley, D.R. and Povey, T.A., "Possibilities Offered by Advances in Communication Technologies," *Bull-UNESCO Regional Office for Education in Asia and the Pacific*, No. 26, pp. 13–36, 1985.

A wealth of information is included in two documents published by the World Bank, three by UNESCO Regional Office for Education in Asia and the Pacific and one by the Asian Development Bank. One document by the World Bank describes the function of radio, but most of them are cases in countries other than those in Asia and the Pacific.

The general state of the issue can be gained from "The Educational Use of Mass Media" (1981) by the World Bank,[4] "Distance Education" (1985) by the Asian Development Bank,[5] "Working Group Meeting on Use of Advances in Communication Technologies for Higher Education Purposes" (1985) by UNESCO ROEAP,[6] "Distance Education in Asia and the Pacific" (1985) by UNESCO ROEAP,[7] and "Final Report of the Fifth Asian Seminar on Educational Technology in Tokyo" (1986) by the Japanese National Commission for UNESCO.[8]

In the last two documents and a paper entitled "Possibilities in Communication Technologies in the Working Group Meeting Document,"[9] present state of new communication technologies in Asian and Pacific distance education is described. Specific technologies dealt with the word processing, radio, audiocassettes, broadcast television, slow-scan television, videocassettes, videodiscs, microcomputers, satellite, audio teleconferencing, teleconference, electric mail, teleblackboard, facsimile, telephones, computer-based education and interactive technologies.

Costs of educational media were analyzed by two documents, one by Mr. M. Sharma[10] (1985) and another by UNESCO (1980) entitled "The Economics of New Educational Media."[11]

In the report "Open Education: Experiments and Experiences in Asia and Oceania" (1978)[12] the relationship between educational technology and open education was examined.

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[4] Feliciano, G., Hancock, A., Hein, G., Horley, A., Jenkins, J., Lambert, W., Peraton, H., Sakamoto, T., Sidoti, N., Tiffin, J. and Futagami, S., *The Educational Use of Mass Media*, World Bank, Staff Working Paper, No. 491, 1981.

[5] Sharma, M., *Distance Education*, Professional Staff Paper, ADB, 1985.

[6] UNESCO ROEAP, *Ibid.*, 1985.

[7] UNESCO, Bangkok, "Distance Education in Countries of the Region," *Bull-UNESCO Regional Office for Education in Asia and the Pacific*, No. 26, pp. 37–74, 1985.

[8] Japan National Commission for UNESCO, *Final Report of the Fifth Asian Seminar on Educational Technology in Tokyo*, September 1986.

[9] UNESCO ROEAP, "Possibilities in Communication Technologies," in the Working Group Meeting Document, *Bull-UNESCO*, 1985.

[10] Sharma, M., *Distance Education*, Professional Staff Paper, ADB, 1985.

[11] UNESCO, "The Economics of New Educational Media," *Cost and Effectiveness*, Vol. 2, 1980.

[12] UNESCO, "Open Education: Experiments and Experiences in Asia and Oceania," *Bulletin of the UNESCO, Regional Office for Education in Asia and Oceania*, No. 19, June 1978.

Also in the Regional Symposium on Distance Teaching in Asia, Universiti Sains Malaysia, Penang (1981),[13] the use of educational technology in distance education was discussed.

Mr. Kim's (1984) report on experiences in Korean distance education, states that "lectures on air, classroom attendance and homework assignments are three basic methods of instruction; self-learning textbooks and other reading materials seemed to be more important than any other teaching media".[14] Mr. Kaeley (1984) reported that correspondence material in the semester period is supplemented by recorded cassettes and telephone teaching in Papua New Guinea.[15] UNESCO ROEAP (1984)[16] also reported that the relatively simple and inexpensive device such as audiocassette tapes constitutes an important component of the media used by the distance teaching universities in Pakistan, Sri Lanka and Thailand and that the popularity of other means such as videocassette, telephone tutorial seems to be increasing. It also indicated that the role of radio and television is minimal in formal instruction with the exception of the three universities in Pakistan and Thailand which make substantial use of both radio and television.

UNESCO ACEID (1984)[17] treated the topic on selecting appropriate media in the report. Radio is a simple but powerful mass media and often utilized for distance education.

MESC, Philippines (1985)[18] reported that taped literacy materials were developed and broadcast through mass media facilities in order to reach more learners at a single time.

Several reports showed that radio was also utilized in the Korean Educational Development Institute,[19] in the Philippines[20] and in Pakistan.[21]

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[13] Dhanarajan, G. and Lim, Mariam (eds.), *Report on the Regional Symposium Organized by Off-Campus Academic Programme*, Off-Campus Academic Programme, Universiti Sains Malaysia, 1981.

[14] Kim, Synghan H., "Korean Distance Learning Systems and Structure," *ASPBE Courier*, No. 30, March 1984.

[15] Kaeley, G. S., "A Comparative Study of Distance Teaching in Papua New Guinea and Kenya," *ASPBAE* Courier, No. 30, March 1984.

[16] UNESCO ROEAP, *Resource Materials Used in Distance Teaching by Higher Education Institutions*, Bangkok, 1984.

[17] UNESCO ACEID, *Distance Education: Exemplar Training Materials*, 1984.

[18] Philippines, Ministry of Education, Culture and Sports, Non-formal Education Sector, *A Country Report on Development in Philippine Education: 1978–1985*, Produced for the Fifth Regional Conference of MINEDAPV, Bangkok, UNESCO, 1985.

[19] Lee, Futagami and Braithwaite, "The Korean Air Correspondence High School," In UNESCO, *The Economics of New Educational Media*, Paris, 1980.

[20] Fineza, Andrea Olympia, *The Philippine Experience in Distance Education: Case Studies in a Developing Country*, Manila, Asian University for Independent Study, 1981.

[21] Allama Iqbal Open University, *The Effectiveness of Radio and Television in the Distance Teaching Programme of Allama Iqbal Open University*, 1982.

The importance of radio in distance education is also discussed in papers and workshops.[22]

Television is now being utilized for distance education in several countries. Television for farmers (1980)[23] which was given on the air in the Philippines was not so extensive as that of radio, because very few farmers had TV sets and many villages in the country had not yet been reached by electricity. Agricultural programs for farmers were also broadcast through radio and TV by the Malaysian Ministry (1982).[24]

Ramkhamhaeng University (1984)[25] described the use of radio and television network all over the country for delivery lectures to students in remote areas and those who cannot afford television sets in Thailand.

APEID Technical Working Group Meeting (1980)[26] developed guidelines for the production of radio and TV programs. As far as the use of satellite in distance education is concerned, papers on the SITE experience (1976, 1983)[27] and INSAT (1983, 1985)[28] were presented.

Recent application of advance communication technologies in distance education was discussed in several seminars and papers. But very few were actually utilized in Asian and Pacific countries.

For example, in Indonesia, USAID sponsored a rural satellite project aiming at developing satellite teleconferencing network. While using one audio channel for conferencing and another for audio graphic support such as tele-blackboard, facsimile, or slow-scan video, through telephone circuit and PALAPA domestic communications satellite network, the system also permits multi-access interactive communication. The origin of the project might be the UNESCO Report in 1983 which examined how to play the networks into Indonesia's satellite, activating two-way communication production training workshops using computers, teleprinters and facsimile machines.

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[22] Martin, Rev., "Distance Teaching Workshop," *Papua New Guinea Education Gazette*, Vol. 16, No. 9, 1982.

[23] Fernandez, Rodolfo A., *Multi-Media Support for Agricultural Development Programmes: MASAGANA 99*, Educational Broadcasting International, 1980.

[24] Nuruddin bin Jamin, *Distance Learning in Malaysia*, Country Report for APEID Study Group Meeting on Distance Learning Systems and Structures, Wellington, New Zealand, 1982.

[25] Ramkhamhaeng University, University Research Committee, *Ramkhamhaeng University: An Overview*, Proceedings of the International Conference on Open Higher Education, Ramkhamhaeng University, 1985.

[26] UNESCO ROEAP, *Production and Utilization of Educational Broadcasting Programmes, 1980*, Report of APEID Technical Working Group Meeting on Educational Broadcasting, Kuala Lumpur, Malaysia, November 19-December 1, 1979.

[27] Chander, Romesh and Karnik, Kiran; *Planning for Satellite Broadcasting: The Indian Instructional Television Experiment*, UNESCO, 1976.

[28] Mohanty, Jagannath, "Educational Television Programme under INSAT," *The Education Quarterly* Vol. 35, No. 1, 1983.

India, Ministry of Education, *Use of Satellite Television: Educational Developments in India 1980–1985*, Country Report Presented at the Fifth Regional Conference of Ministries of Education and Those Responsible for Economic Planning of Member States in Asia and the Pacific held in Bangkok, New Delhi, 1985.

As far as teacher training by distance education is concerned, radio and TV are sometimes utilized,[29] but no report described the use of radio and TV for teachers in distance education.

One exceptional description was found in the ACEID paper (1979)[30] that in the Philippines a recommendation was made to include in teacher education courses the familiarization with various modes of delivery system for education such as radio, TV, self-instructional kits and distance study schools.

The necessity of teacher training on the utilization of advanced communication technology in distance education is not emphasized yet in Asia and the Pacific. At the moment, only description of functions and mechanisms of these new technologies seem to be the focus of interests.

C. Policies and Plans on Hardware and Software in Distance Education

In Asian and Pacific countries, main policies and plans on hardware and software in distance education concern the four developmental issues such as hardware, software, staff and system development.[31]

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[29] APEID Technical Working Group Meeting on Distance Learning for Teacher Education, *Distance Learning for Teacher Education*; Report, Bangkok, UNESCO, 1982.

Graham Jack, "The Radio Education Teacher Training Project in Nepal," *Education Quarterly* Vol. 28, No. 1, 1983.

UNESCO ROEAP, *Distance Learning for Teacher Education*, Report of a Technical Working Group Meeting, Pakistan, November 1981, Vol. I: Current Status, Programmes and Practices. Vol. II: Guidelines on Development of Materials, Vol. III: Exemplar Materials.

UNESCO APEID, *Training of Personnel for Distance Education*, Report of the Seminar Organized by the APEID in Collaboration with Allama Iqbal Open University in Islamabad, Regional Seminar on Further Training of National Officials and Specialists in Distance Education, Pakistan, August 1983.

UNESCO APEID, *Distance Learning and Structures — Training of Distance Educators*, Sub-Regional Training Workshop on Distance Learning Systems and Structures — Training of National Officials and Specialists, Colombo, July 1984.

[30] Asian Centre of Educational Innovation for Development (ACEID), Bangkok, *Policy Studies in Asia – The Training of Educational Personnel: India, Nepal, Pakistan, Philippines, Thailand*, Bangkok, UNESCO, 1979.

[31] UNESCO ROEAP, *UNESCO Regional Technical Co-operation for Training Ed[illegible]nal Personnel in Planning and Management Using Distance Teaching and Other Techniques*, Project Findings and Recommendations, Terminal Report, 1983.

UNESCO ROEAP, *Training of Personnel for Distance Education*, Report of a Regional Seminar, Pakistan, August 1983.

Japan National Commission for UNESCO, *Final Report of the Fifth Asian Seminar on Educational Technology in Tokyo*, September 1986.

Firstly, India and Indonesia are particularly interested in hardware development. In India, the National Policy in Education (1986) plans to set up basic infrastructure and facilities in schools. One issue is to use low-cost aids and radio. In Indonesia, rural areas have a big problem in transportation and communication and, consequently, in expanding the secondary and higher education and also improving the quality of education. Therefore, the Indonesian Government considers the use of innovative delivery system by the application of modern communication technology such as radio, television and satellite as a possible alternative solution to the problem. In Malaysia, supply of videocassette recorders to all secondary schools in the country, the establishment of regional dubbing centers and establishment of 365 District Resource Centers equipped with various AV devices and materials throughout the country, each serving 15–20 surrounding schools are planned.

Secondly, Bangladesh, Sri Lanka, Malaysia and Thailand are interested in software development. In particular, school broadcast is considered as a supplement to school instruction in these countries. Targets are dominant at primary level in Thailand, at senior secondary level in Sri Lanka, and at formal teaching in Pakistan.

Thirdly, teacher training is a very important issue in many Asian countries. In Nepal, untrained rural primary school teachers are continuously trained by radio. In Bangladesh, development of quality of teachers are trained by radio at secondary school level. In Malaysia, there is a plan to train about 6,000 primary school teachers using distance education methods, namely correspondence materials as well as audio and video programs. In Thailand, in-service teacher training is conducted by radio. Education for agriculture, industry, home economics, handicrafts, health, population, etc. is undertaken through radio in rural adult education. Pakistan is now launching education for degree program for secondary level teachers.

Fourthly, many Asian and Pacific countries are interested in developing their own distance education systems. The objective of distance education in Pakistan is to deliver education to its growing population through correspondence, radio, television and other techniques as possible alternatives to ordinary teaching. Aims in the Philippines are to deliver education to out-of-school youth and adults and to provide learning opportunities to those living in the hinterlands and the hardly accessible island divisions by constructing cost-effective delivery system. Purposes in Papua New Guinea are to provide an education for those people who are unable to continue their studies through the formal system and to provide a means whereby, without leaving the workplace, men and women can study and upgrade their qualifications. Korean policy of distance education is to develop qualitatively and quantitatively in order to keep up with the Korean zeal for studies on the rapid trends of industrialization.

These policies and plans reflect the countries' needs and situations. The most effective way to expand distance education in the different cultural and economic context of Asian countries is to continue their own policies and plans according to the nations' needs.

D. Roles of Government and Non-Government Organizations

Suppliers of hardware and software for distance education produce and disseminate their products while users purchase and utilize them in the educational institutions or at home. Administrators, managers and consultants give pieces of advice and recommendations on distance education to both suppliers and users, and plan to train personnel for utilizing both hardware and software. Usually, suppliers of hardware are non-government, commercial industries. They produce telephone, radio, TV sets, microcomputers, etc. and disseminate them to users. They advertise their products for good marketing. Sometimes they ask for advice or recommendations from administrators, managers, consultants and users in order to produce appropriate products for distance education.

Users usually purchase products through financial aid from governments in public education systems and utilize them according to the advice of government officials such as superintendents or technical advisors. But in the private sector, users select and purchase appropriate products according to their budget.

Administrators, managers and consultants who usually belong to public educational institutions, make plans and budgets for purchasing hardware for schools and study centers, give advice and recommendations for selecting and purchasing them, and train technical staff for operating them. However, some experienced commercial industries have good advisors for showing excellent characteristics of hardware products and for operating them effectively.

Suppliers to produce and disseminate software are usually governmental in terms of radio and TV broadcasting, but sometimes nongovernmental in terms of software such as tape, videotape, educational software for Computer Aided Instruction (CAI). Even in the latter, government officers in educational institutions are often advisors and consultants for these commercial industries.

Users in the public domain are supported by government finance and advice for selecting and purchasing appropriate software and use them effectively, according to advice and training by public officers in educational institutions.

In the private sector, users buy appropriate software through their own budget and utilize them on their own. But they sometimes ask advice and training for specialists in public domain. Of course, they get and utilize software according to information from suppliers.

Competition between government and non-government sectors for producing and disseminating software sometimes enhances quality of software.

Here, the delivery system is mostly governmental such as postal service, telephone network and the broadcasting network in many Asian and Pacific countries. But some of traffic transportation is undertaken by private industries. The amount is not so small. Good competition and cooperation between government and non-government sectors are very important for promoting more hardware and software production, dissemination and utilization.

STRUCTURE OF DISTANCE EDUCATION

A. Structure of Teaching-Learning Processes

The core of teaching-learning process is the interaction between teachers and learners. These are some behavioral changes produced as a result of their mutual information transmission and reception.

When a learner wants to learn any subject and solve any problem, he sometimes feels it rather difficult to do so, i.e. to find solution to a problem and evaluate his own behavior. Therefore, he needs the teacher's help to be able to do this.

Figure 1 shows teaching-learning process which consists of eight steps.[32]

(1) *Information Processing (by teacher)*

Teacher evaluates learner's achievement, personality, physical ability, and decides the relevant objectives and teaching methods.

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[32] Sakamoto, T., *Nature and Use of Instructional Media*, Japanese National Commission for UNESCO, UNESCO, 1972.

(2) *Presentation of Information*

Teacher presents a series of information which may be useful for helping learner to attain the educational objectives.

(3) *Reception of Information*

Learner receives the information transmitted by the teacher, and knows teacher's intention and demands, and the contents of the subject matter.

(4) *Information Processing (by learner)*

Learner interprets and understands what teacher has presented. He thinks, judges, reasons out about the problems, and finally decides how to behave.

(5) *Response of Learner*

As a result he responds to teacher. For example, he sings a song, expresses his opinions, writes down the results of the problem solution, etc.

(6) *Teacher's Diagnosis*

Teacher observes learner's behavior and knows how learner behaves and changes.

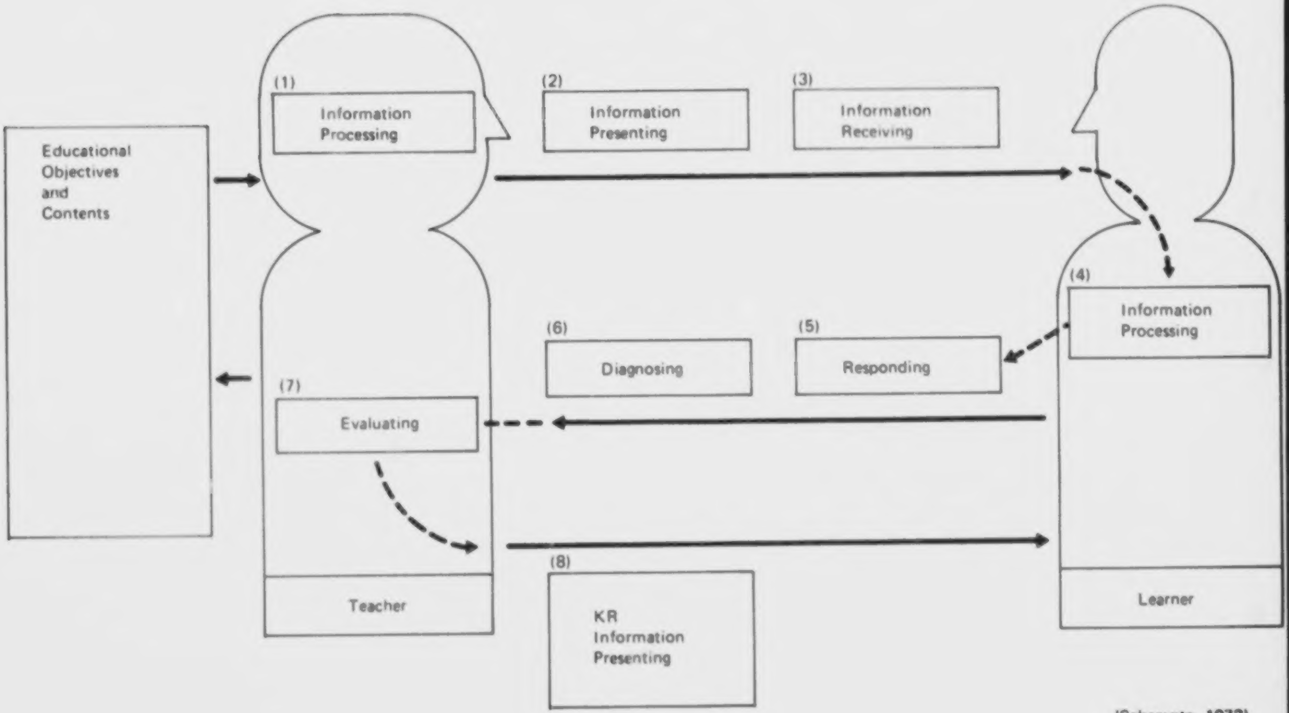
(7) *Teacher's Evaluation*

Teacher evaluates the quality and degree of learner's developments by collating learner's behavioral changes with the educational objectives. Then, teacher presents the supplementary information or the next information depending upon the learner's performance.

(8) *Presentation of Knowledge of Results (KR) to Learner*

By the presentation of teacher's KR, learner knows the degree and quality of his learning. KR is a kind of feedback information. For example, in responding to his behavior, teacher says, "good," "wrong," "no," "well," "huum," "wonderful," "interesting" and sometimes repeats and summarizes learner's opinions. Sometimes teacher gives

Figure 1: 8-STEP TEACHING-LEARNING PROCESS


Educational Objectives and Contents
(1)
Information Processing
(2)
Information Presenting
(3)
Information Receiving
(4)
Information Processing
(5)
Responding
(6)
Diagnosing
(7)
Evaluating
(8)
KR Information Presenting
Teacher
Learner

(Sakamoto, 1972)

him many non-verbal KR; nodding, smiling, winking and making gestures. The former is called intellectual KR and the latter is affective KR.

These eight steps of teaching-learning process include three-way communication which is the principal function in effective teaching-learning process, i.e. communication from teacher to learner (steps (2) and (3)), from learner to teacher (steps (5) and (6)) and again from teacher to learner (step (8)). Through this three-way communication, teacher would know how effective and suitable his teaching is to learner, and learner would also know how well his learning ability is progressing and how sure he can learn.

Therefore, teachers should firmly establish this three-way communication of teaching-learning process.

B. Function of Instructional Media

Effective result of educational technology is made possible: (i) by means of educational devices, equipment and computers; (ii) by effective teaching techniques; (iii) by arranging various types of learner groups; (iv) by designing various kinds of instructional courses and programming; (v) by preparing other optimal educational conditions and environment for learning; and (vi) by improving instructional processes through effective evaluation.

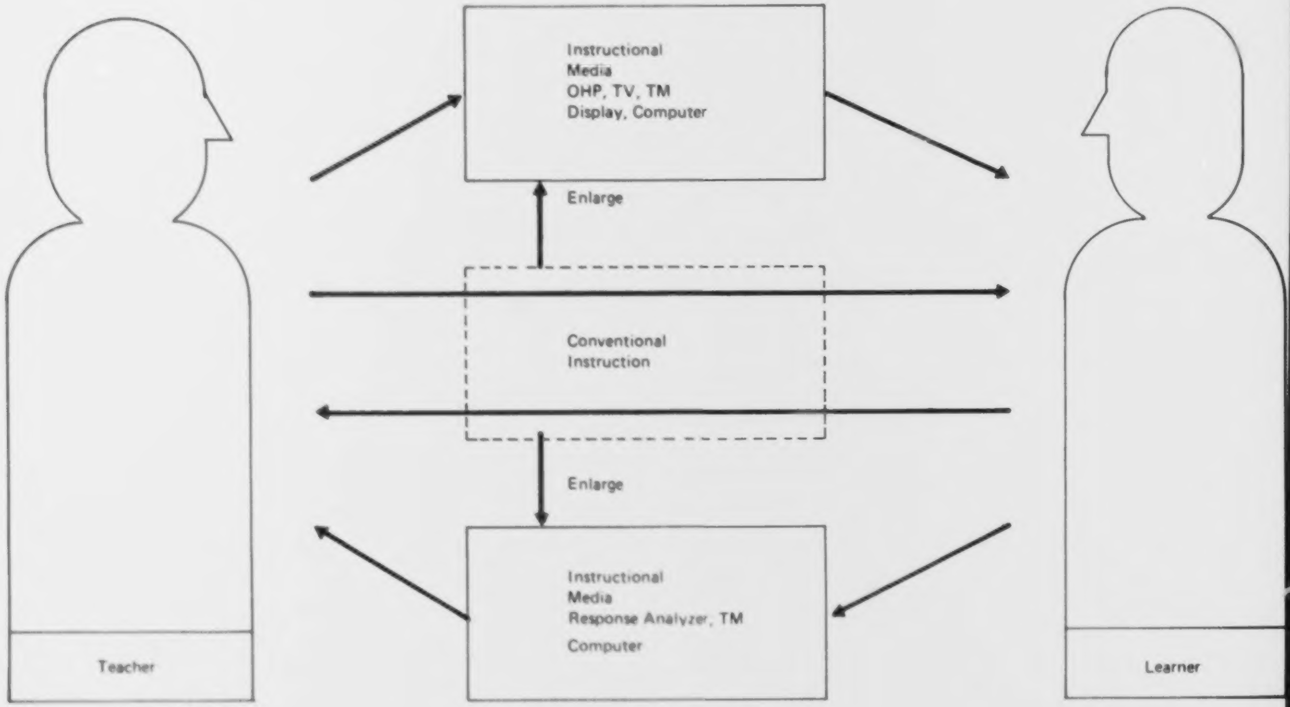
Instructional media, including educational devices and equipment, aim to expand the three-way communication in teaching-learning process. Computers aim mainly to expand teaching, information retrieval and data processing functions of teacher.

Figure 2 shows the comparison of the conventional instruction with the instruction expanded by instructional media.

Teacher's information presentation including KR – such as verbal instruction, facial expression, gestures, writing on blackboard, showing the maps, and so on – is expanded by means of OHP, TV and computer display, etc. Teacher's evaluating activities, such as observing learner's behavior and examining learner's workbook, are expanded by means of Response Analyzer and VTR, etc.

Many teaching devices partially enlarge the instructor's teaching functions. Figure 3 shows the classification of the instructor's teaching functions. First of all, the instructor's teaching function can be divided into instruction and evaluation; then the instructional function can be sub-divided into presentation of information and control of response. The function of presentation information is further sub-divided into material presentation and KR presentation to the learners; and the

Figure 2: EXPANSION OF TEACHING-LEARNING PROCESS BY MEANS OF INSTRUCTIONAL MEDIA


Instructional
Media
OHP, TV, TM
Display, Computer
Enlarge
Conventional
Instruction
Enlarge
Instructional
Media
Response Analyzer, TM
Computer
Teacher
Learner

(Sakamoto, 1972)

response control function is further sub-divided into arousal of response and regulation of response. On the other hand, evaluation function is divided into two parts, collection of information concerning learners and their diagnosis and collection of information concerning teaching effects and their diagnosis.

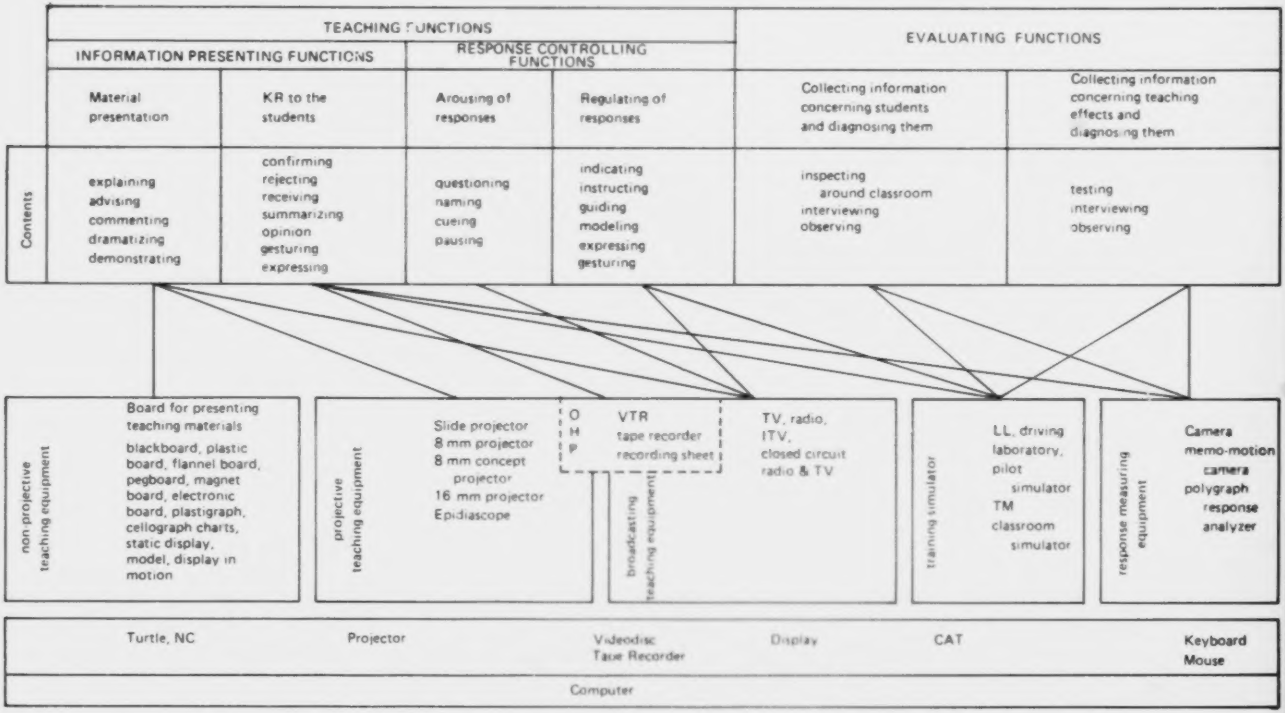
The teaching functions of the instructor should not be isolated in the classroom but mutually and closely interrelated. For example, while instructors are giving explanation to the learners, they observe their gestures and expressions. Instructors ask questions to individual learners while explaining and giving their opinion.

In the classroom, various teaching functions of the instructor are naturally conducted but it does not mean that they are always balanced. The presentation of teaching materials such as commenting, explaining and demonstrating, is more important in the direct type of teaching subject matters. On the contrary, in the non-direct type of teaching subject matters, there is more weight placed on the KR to learners and arousal of response, such as confirming, rejecting, summarizing, receiving, gesturing and pausing. In motor skill training, there is more weight placed on response control such as indicating, instructing and guiding. Therefore, in using various teaching devices, these points must be considered to promote efficiency in education. As indicated at the bottom of the figure, non-projective teaching tools and projective teaching equipment are functions of material presentation. Broadcasting equipment is a function both of material presentation and response control. Again, training simulators mainly have the function for KR to learners, response control function and evaluation function. Finally, response measuring equipment has a function for evaluation only.

The computer draws our attention here. This equipment expands all the teaching functions, though it cannot easily expand its function in all the items listed in the diagram. More research and development is essential for the computer to take the place of human gestures and expressions.

In the use of such media in teaching-learning process, the following must be taken into consideration. The educational broadcast and audio-visual education especially expands the function of material presentation and the control of responses in the classroom, but it lacks very important teaching functions such as KR and evaluation. Therefore, it is important to fill in these missing functions. In order that the teacher may make up for these functions, it is effective to make the learners discuss the subjects to give them supplementary content, to let them write a report, etc. For those learners listening to educational broadcasts in correspondence courses, it is necessary to provide them with an intensive schooling course for a definite period.

Figure 3: RELATIONSHIP BETWEEN TEACHER'S FUNCTIONS AND INSTRUCTIONAL MEDIA


TEACHING FUNCTIONS
INFORMATION PRESENTING FUNCTIONS
RESPONSE CONTROLLING FUNCTIONS
EVALUATING FUNCTIONS
Material presentation
KR to the students
Arousing of responses
Regulating of responses
Collecting information concerning students and diagnosing them
Collecting information concerning teaching effects and diagnosing them
Contents
explaining
advising
commenting
dramatizing
demonstrating
confirming
rejecting
receiving
summarizing
opinion
gesturing
expressing
questioning
naming
cueing
pausing
indicating
instructing
guiding
modeling
expressing
gesturing
inspecting around classroom
interviewing
observing
testing
interviewing
observing
non projective teaching equipment
Board for presenting teaching materials
blackboard, plastic board, flannel board, pegboard, magnet board, electronic board, plastigraph, cellograph charts, static display, model, display in motion
projective teaching equipment
Slide projector
8 mm projector
8 mm concept projector
16 mm projector
Epidiascope
O H P
VTR
tape recorder
recording sheet
broadcasting teaching equipment
TV, radio, ITV, closed circuit radio & TV
training simulator
LL, driving laboratory, pilot simulator
TM classroom simulator
response measuring equipment
Camera
memo-motion camera
polygraph
response analyzer
Turtle, NC
Projector
Videodisc
Tape Recorder
Display
CAT
Keyboard
Mouse
Computer

(Sakamoto, 1972)

C. Classification and Characteristics of Instructional Media

Figure 4 shows the system of instructional media which serves the expansion of the three-way communication. This figure shows the media which are being used nationwide and indicates those which are being used in schools for the purpose of research and development of educational technology.

- Symbol System – characters, numerals, graphs, tables, figures;
- Printed Matter – books, magazines, handouts;
- Information Materials for Presentation – blackboard, flannel board, electric board;
- Information Objects for Presentation – maps, charts, models, puppets, demonstration play;
- Information Media for Presentation – slide, filmstrip, transparency, film, concept film, tape, sheet, record, videotape, videodisc;
- Information Devices for Presentation – projector, video display, VTR, videodisc player;
- Training Device – simulator, VTR;
- Response Measurement Instrument – response analyzer, camera, VTR, photo floppy display; and
- Information Processing Equipment – computer, sorter.

Table 1 shows a classification of characteristics of main instructional media. Such classification may be useful for teachers to understand optimal use of instructional media.

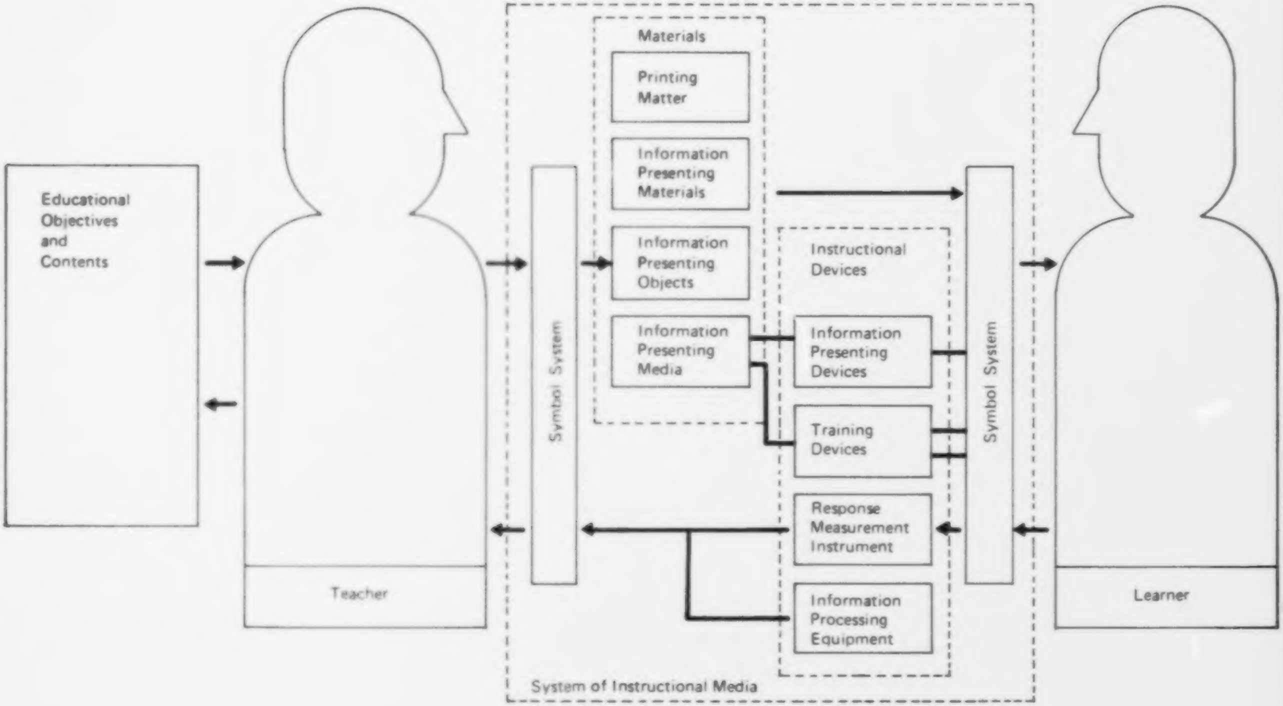
D. Two Kinds of Distance Education

There are two types of distance education depending on local teachers' participation.

One type is the distance education with local teachers' instruction. Figure 5 shows a situation where a local teacher gets educational materials from the Resource Centers by transportation, broadcast or transmission vehicles, and teach classroom students using these media. For example, he utilizes printed materials, videotapes, videodiscs, radio, TV, floppy discs for CAI and so on.

The distance here is between educational resources and teachers. Three-way communication is still functioning between the teacher and students and educational materials partly assist teachers' function. Another

Figure 4: SYSTEM OF INSTRUCTIONAL MEDIA



Educational Objectives and Contents
Teacher
Symbol System
Materials
Printing Matter
Information Presenting Materials
Information Presenting Objects
Information Presenting Media
Instructional Devices
Information Presenting Devices
Training Devices
Response Measurement Instrument
Information Processing Equipment
Symbol System
Learner
System of Instructional Media

(Sakamoto, 1972)

is the distance education without a local teacher. In a sense this is a direct distance education. Here the distance is between resources and learners.

Figure 6 shows the situation where teaching materials are transported, broadcasted or transmitted directly to the learners. In this case, the distance is between remote instructors in educational resources and learners. Three-way communication is expanded between the instructors and learners at a distance. For example, distance education via broadcast, CATV or telecommunication belongs to this type.

DIVERSITY OF DISTANCE EDUCATION

A. Distance Education in Formal and Non-Formal Context

Distance education is conducted both in formal and non-formal education.[33] In formal education, primary and secondary schools can undertake distance education either in classroom teaching situation or direct distance teaching situation. For example, school children often study by radio and ETV in their classroom instruction and students of correspondence schools also study educational materials mailed from the school at home.

In non-formal education, both school children and adults study subject matters by broadcast programs or correspondence teaching materials at home or at working places. For example, young children watch ETV programs at home or adults study by correspondence textbooks at working places.

B. Vehicles for Distance Education

There are three vehicles for conveying educational materials or information from the educational resource centers to educational institutions: transportation, broadcast and transmission. Educational software such as slide, videocassette tape, floppy disc, audiocassette tape, experiment kits, printed materials and so on are transported to the educational institutions by postal services or traffic means.

Educational radio, TV programs, teletext information and so on are conveyed from the center to schools by broadcast, and audiovisual

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[33] Sakamoto, T. *The Diversity of New Distance Teaching Institutions: The Japanese Experience*, ICDE, 13th World Conference, Melbourne, 1985.

Table 1: CHARACTERISTICS OF INSTRUCTIONAL MEDIA

		Printed matters		Information presenting material	Information presenting object				Broadcasting equipment					Response measurement instrument	Training devices	Information processing equipment	
									TELEVISION								
		Textbook	Programmed book	Blackboard	Model	Concept film	Film	OHP	Use of broadcasting education	Correspondence education by broadcasting	ITFS CCTV	Televised still picture	Use of television for CAI	Analyzer	Simulator	Remote access	CAI
Teaching function	Material presentation	◎	◎	○	○	◎	◎	○	◎	◎	◎	◎	◎	×	○	◎	○
	Knowledge of results	△	○	×	△	×	△	○	×	△	○	×	◎	○	◎	×	◎
	Arousing of responses	○	◎	△	○	◎	○	○	◎	◎	◎	×	◎	×	◎	○	◎
	Regulating of responses	○	◎	△	△	○	○	△	○	◎	◎	×	◎	×	◎	○	○
	Evaluation and diagnosis	×	○	×	×	×	×	×	×	×	○	×	○	◎	○	×	◎
Assistance for learning function	Information acceptance	◎	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	×	○	◎	◎
	Information processing	○	◎	△	○	△	○	○	○	○	◎	○	◎	○	○	○	◎
	Response to information transmission	△	○	△	△	△	△	△	△	△	△	△	○	○	○	○	◎
	Response to the tasks	△	○	△	△	△	△	△	△	△	△	△	○	△	○	○	◎
	Response of controlling	△	○	△	△	△	△	△	△	△	△	△	△	○	◎	△	◎
	Self-evaluation	△	◎	△	○	△	△	○	○	○	◎	○	◎	○	◎	○	◎
	Information retrieval	○	△	×	△	△	△	×	×	×	△	◎	○	×	△	◎	◎
	2 way communication	×	◎	×	△	△	×	△	×	×	○	△	◎	○	○	△	◎
	3 way communication	×	○	×	△	△	×	△	×	×	○	×	○	○	○	×	◎
Objective	Knowledge	◎	◎	○	○	◎	◎	◎	○	◎	○	◎	◎	○	×	◎	◎
	Skill	×	△	×	○	×	○	×	×	○	○	×	○	×	◎	◎	○
	Ability	○	○	○	○	△	○	○	○	○	◎	△	○	○	○	○	○
	Attitude	○	△	△	○	◎	○	×	◎	○	◎	×	○	×	△	△	○
Cost	Cost	○	△	◎	△	△	△	△	△	△	△	?	?	×	×	×	×
	Operational cost	◎	◎	◎	○	×	△	○	◎	○	△	?	?	○	◎	○	×
	Number of learners	◎	◎	△	△	△	◎	○	◎	◎	△	◎	◎	△	△	○	△
	Cost/no. of learners	◎	◎	◎	△	×	◎	◎	◎	○	○	○	○	△	△	△	△
	Preparation	◎	△	◎	○	△	△	◎	◎	○	△	△	×	△	△	△	×
	Preservability	○	○	◎	○	△	○	◎	○	△	○	◎	○	△	△	◎	○
	Repeatability	○	○	○	◎	△	◎	◎	×	△	◎	◎	◎	×	◎	◎	◎
	Use of existing system	○	○	○	○	△	○	○	◎	◎	○	○	○	×	×	△	△
Way of use	Utility																
	Practicality	◎	○	◎	○	○	○	◎	◎	◎	◎	◎	○	○	◎	○	△
	Individual learning	◎	○	○	○	×	○	×	○	◎	×	◎	◎	×	◎	◎	◎
	Group learning	◎	○	○	○	◎	○	◎	◎	○	○	△	△	◎	×	△	×

Sakamoto, T., Nishida, K. and Azuma, H. 1972. *The Use of Modern Media in Adult Education* Japanese National Commission for UNESCO

(Sakamoto, 1972)

Figure 5: DISTANCE TEACHING WITH A LOCAL TEACHER

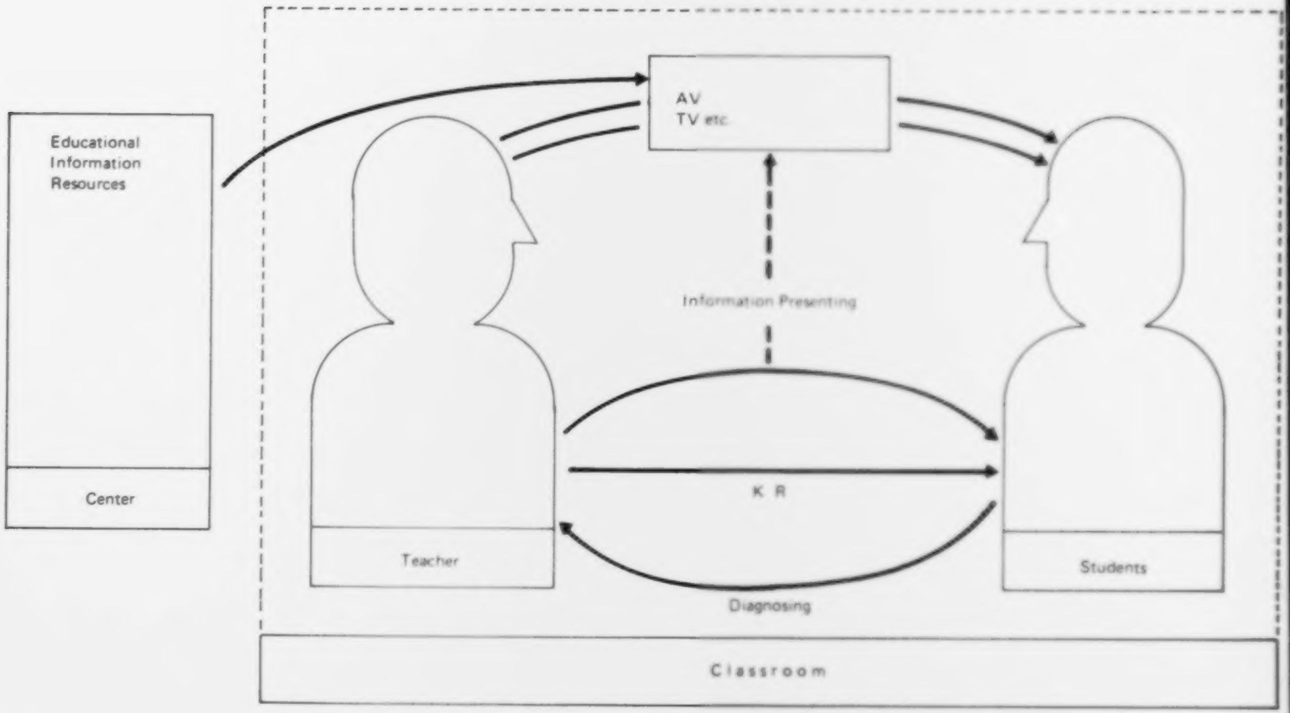
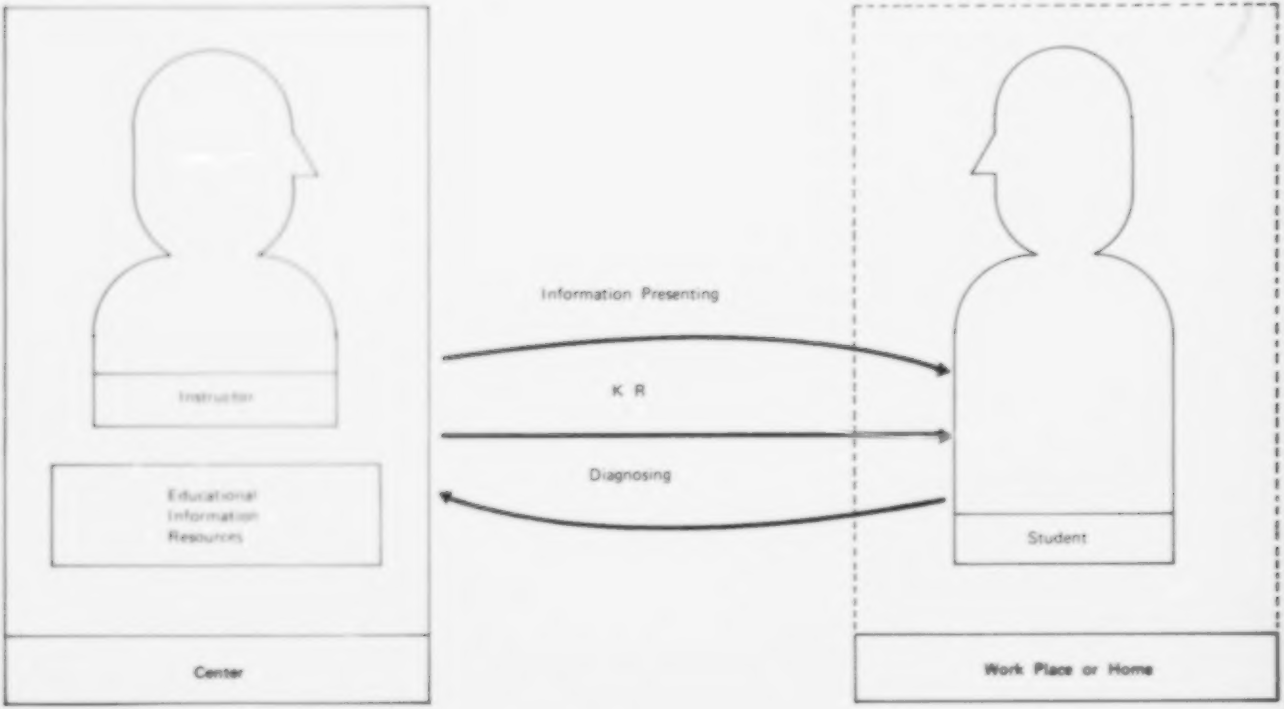

Educational
Information
Resources
Center
AV
TV etc.
Information Presenting
K R
Diagnosing
Teacher
Students
Classroom

Figure 6: DIRECT DISTANCE TEACHING


Instructor
Educational
Information
Resources
Center
Information Presenting
K R
Diagnosing
Student
Work Place or Home

information is transmitted by media such as SSTV and VRS. Educational information is also transmitted by telecommunication such as CAPTAIN, Electronic Mail, computer network.

Table 2 shows the configuration of media for distance education. Also Figure 7 shows the flow of media in distance teaching situation. Even if the delivery methods are different, educational software and terminal devices are sometimes the same. Therefore, we can consider a variety of alternatives in distance education.

C. Different Types of Distance Education

Different types of distance teaching are widely conducted as shown in Table 3. To begin, there are three major vehicles of distance teaching: transportation, broadcasting and transmission technology; and two major forms of such education: formal and non-formal. In the former case, there are three types: primary and secondary school education, university and college teaching, and university extension courses. In the latter case, there are two types: private coaching school teaching and social education for young children and adults. When the three types of distance teaching vehicles and the five types of teaching are combined, 15 different kinds of distance teaching can be found. The following are cases in Japan.

The first three relate to regular primary and secondary school education.

(i) Use of AV materials in classrooms;
(ii) Correspondence teaching in 12 independent correspondence high schools and 72 correspondence courses attached to full-time high schools;
(iii) Uses of radio and television in the NHK Gaukuen correspondence high school and regular primary secondary school classes; and
(iv) Use of CAPTAIN in a primary school and transmission of educational materials via computer network from a local board of education to local schools.

The second three cases relate to regular university teaching:

(i) Use of video software for teacher training;
(ii) Correspondence courses at 12 private universities and ten junior colleges, two of which were started in 1974;
(iii) Use of broadcasting in some of the abovementioned correspondence courses (started in 1958) as well as in the University

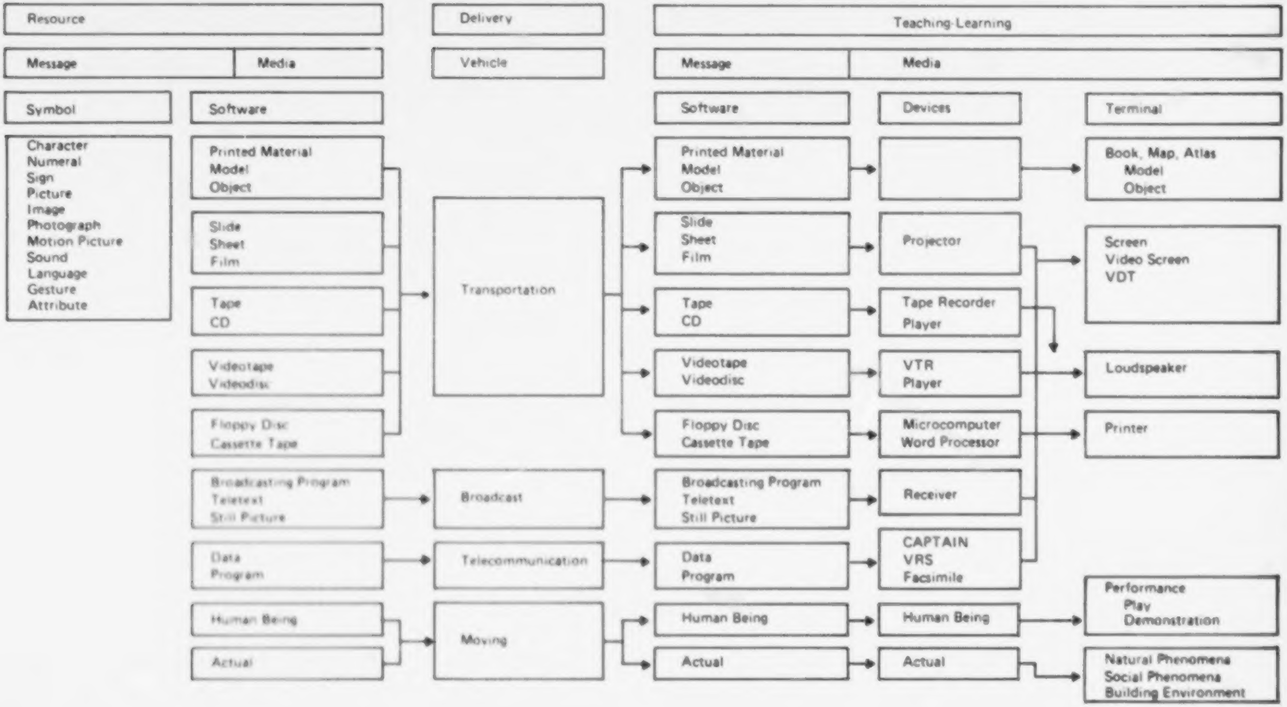
Table 2: KINDS OF MEDIA FOR DISTANCE EDUCATION

Method of Communication		Delivery		Terminal Device	System
		Software	Hardware		
Transportation Postal Service Transportation Service		* Printed material * AV material * Educational Software	* Vehicles	* Projector * Player * Microcomputer * Word Processor	Correspondence stand alone unit
Broadcasting		Auditory Information Character Still picture Graphics Moving picture	AM FM VHF UHF	Radio receiver TV monitor	Radio TV Broadcast Teletext
Transmission	Visual transmission	AV Information	* Telephone line * Coaxial cable * Optical fiber * Broadcast	VDT	SSTV VRS
	Tele communication	Character Graphics Still picture	Telephone Optical Fiber	Telewriter Microcomputer Electric Board	Videotex FAX Electric Mail Telemail LAN

Table 3: VARIOUS TYPES OF DISTANCE TEACHING

Form	Vehicle Type	Transportation	Broadcast	Telecommunication
Formal	Primary & Secondary Education	- Use of AV materials in classroom and CAI - Correspondence schools and courses	- Use of educational radio and television in classrooms - School of the Air	- Videotex use in schools Data transmission - CATV
	University & College Education	- Use of video software - Correspondence courses in universities and colleges	- Use of radio in correspondence courses - Open University	CCTV Optical fiber lecture transmission Electric Mail, Facsimile
	University Extension Courses	- Special enrollment in correspondence courses	- Use of radio and TV in university extension - Open University	- CATV
Non-Formal	Extra-Curricular Primary & Secondary Education	- Correspondence teaching in private coaching schools	- Use of radio by private coaching schools	- Videotex in private coaching schools - Telephone and microcomputers Guidance system - Use of Facsimile, Electric Mail
	Social Education	- Social correspondence education courses	Use of social education broadcast programs ETV programs for young children	- Use of Videotex - Use of VRS - CATV - Teletraining - Teletext

Figure 7: STRUCTURE OF MEDIA



Resource
Message
Media
Symbol
Character
Numeral
Sign
Picture
Image
Photograph
Motion Picture
Sound
Language
Gesture
Attribute
Software
Printed Material
Model
Object
Slide
Sheet
Film
Tape
CD
Videotape
Videodisc
Floppy Disc
Cassette Tape
Broadcasting Program
Teletext
Still Picture
Data
Program
Human Being
Actual
Delivery
Vehicle
Transportation
Broadcast
Telecommunication
Moving
Teaching-Learning
Message
Media
Software
Printed Material
Model
Object
Slide
Sheet
Film
Tape
CD
Videotape
Videodisc
Floppy Disc
Cassette Tape
Broadcasting Program
Teletext
Still Picture
Data
Program
Human Being
Actual
Devices
Projector
Tape Recorder
Player
VTR
Player
Microcomputer
Word Processor
Receiver
CAPTAIN
VRS
Facsimile
Human Being
Actual
Terminal
Book, Map, Atlas
Model
Object
Screen
Video Screen
VDT
Loudspeaker
Printer
Performance
Play
Demonstration
Natural Phenomena
Social Phenomena
Building Environment

of the Air (started on as experimental basis in 1971 and on a formal basis in 1983): and

(iv) Utilization and transmission technology) i.e. CCTV use at over 20 national universities for teacher education (first began in 1970 at three universities), audiovisual service by intelibot at the Kanazawa Institute of Technology, distance teaching by the optical fibre lecture transmission system at the Tokyo Institute of Technology, use of facsimile in the University of the Air.

The third three cases relate to university extension courses:

(i) A special enrollment system for correspondence courses; and
(ii) Use of broadcasting for non-degree students at the University of the Air and at eight national universities started at two universities in 1978.

The fourth three cases relate to extra-curricular education for primary and secondary school children:

(i) Correspondence courses conducted by *juku* schools;
(ii) Teaching by radio and TV sponsored by *juku* schools;
(iii) Teaching by CAI LAN systems conducted by *juku* schools; and
(iv) Use of facsimile in *juku* schools.

The last three cases relate to out-of-school or social education for young children and adults:

(i) Nationwide social education correspondence courses;
(ii) Broadcasting of educational TV programs for pre-school children by NHK and commercial TV stations and broadcasting of social education programs for adults by NHK and those by commercial stations which are sponsored by the central and local government;
(iii) Transmission of social education programs for adults through CATV, HiOVIS, CAPTAIN and VRS; and
(iv) Telelearning in Japan Management Association.

HARDWARE AND SOFTWARE IN DISTANCE EDUCATION

A. Educational Radio Broadcast

Radio is one of the most popular mass media and relatively easy of access. When listening to a radio program on a portable radio with electric battery, learners need not always have electric power supply. We can get useful information everywhere. As the diffusion rate of radio per household is 150 per cent in Japan, individuals can usually use radio receivers for their own use. Moreover, production cost is rather low. Also radio has several merits as a communication medium. It expands our space and time. It can transmit facts and events both in remote places and in the past time. It can present arts and culture such as music, poem, drama and story. It can stimulate our imagination, as it has no visual constraints. It can emphasize main points and motivate our study by attractive and powerful sound effects.

The Open University group listed down the following appropriate use of radio:[34]

(i) To provide remedial tutorials, or some other forms of tutorial based on feedback.

(ii) To provide corrections, alterations or updating of material, where print re-make budgets are limited, or where print cannot reach students quickly enough.

(iii) To bring to students primary resource material, i.e. recordings which, through careful editing and selection, can demonstrate principles covered in the units. This material may be used in a number of ways, for example:

  (a) recordings of naturally occurring events, e.g. political speeches, children talking, concerts or performances, talks previously recorded for other than Open University purposes (e.g. Reith lectures), eyewitness interviews at historical events;

  (b) to provide students with a selection of sources of evidence to analyze.

(iv) To bring to students the views and knowledge of eminent people which can be condensed in an interview, or be edited afterwards, to provide the essential points, which may be more complex or lengthy in written form.

(v) To record especially the voices of people who have not been recorded before, but whose contribution to the course would provide a unique experience (e.g. famous poets reading their own work, civil servants talking – perhaps anonymously – about their role in decision making).

(vi) To change student attitudes:

  (a) by presenting material in a novel manner, or from an unfamiliar viewpoint;

  (b) by presenting material in a dramatized form, enabling students to identify with the emotions and viewpoints of the main participants.

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[34] Schram, W., *Big Media, Little Media*, Sage, 1977.

(vii) To bring alive the performing arts direct into the student's own home, and to demonstrate methods or techniques of drama or music through performances.

(viii) To provide the student with a condensed argument, in lecture form, which may:
  (a) reinforce points made elsewhere in the course;
  (b) introduce new concepts not covered elsewhere in the course;
  (c) provide an alternative view to that presented in the correspondence text and/or television programs;
  (d) analyze material contained elsewhere in the course, especially in written broadcast notes or television programs;
  (e) summarize the main points of the block or course as far as it has gone, providing integration and orientation;
  (f) draw quotations, recorded information, interviews, etc., as evidence in support of (or against) the argument.

(ix) To enable students to perceive the different points of view that exist, and observe ideas being challenged, through discussions and interviews.

In Japan, there are three channels of radio by NHK and many channels by commercial broadcasting stations. Figure 8 shows weekly broadcasting hours in three NHK channels in 1985.[35] One hour and 52 minutes in NHK 1, 91 hours and 20 minutes in NHK 2, and 5 hours and 15 minutes were provided to educational radio programs. Table 4 shows the time schedule for school radio broadcast in 1986.

Weekly access rate by audience was 50.3 per cent in total as shown in Figure 9. Thirty-three per cent was due to NHK. However, contribution of radio 2 was only 3.2 per cent. Utilization rates in schools were 14.7 per cent for kindergarten and 8.7 per cent for nurseries, 9.4 per cent for primary schools, 13.8 per cent for junior high schools, and 2.9 per cent for senior high schools in 1985. These figures slightly increased from 10.9 per cent for kindergarten and 7.8 per cent for nurseries in 1983, but in schools largely decreased from those of 1984; respectively 19.9 per cent, 21.4 per cent and 10.4 per cent as shown in Figure 10.

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[35] NHK, *NHK School Broadcasting*, School Education Division, NHK, 1986.

Table 4: RADIO II NETWORK SCHOOL BROADCAST SCHEDULE FOR 1986

Day / Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Day / Time
A.M.							High School Course	A.M. 5:30
								6:10
9								9
45	Fairy Tales (Kindergartens, nurseries) For elder children	For elder children	For younger children	For younger children	Intermediate	Intermediate		45
10	Japanese Language (P_S-1)	Japanese Language (P_S-2)	Japanese Language (P_S-3)	Japanese Language (P_S-4)	Japanese Language (P_S-5)	Japanese Language (P_S-6)		10
15	Ethics	Music	Music	Ethics	Ethics	Ethics		15
30	Senior High School Course English II	Mathematics II	English II	Mathematics II	English II	Mathematics II		30
50	School Music Contest Hour							50
11 P.M. 1							Time for Teachers	11 P.M. 1
								2.30
						High School Course	High School Course	4.20
6						Part-Time High School		6
								20
8 9	Senior High School Course							8 9

Figure 8: WEEKLY BROADCASTING HOURS OF DIFFERENT CATEGORIES IN WEEKLY PROGRAMMING (As of April 1985)

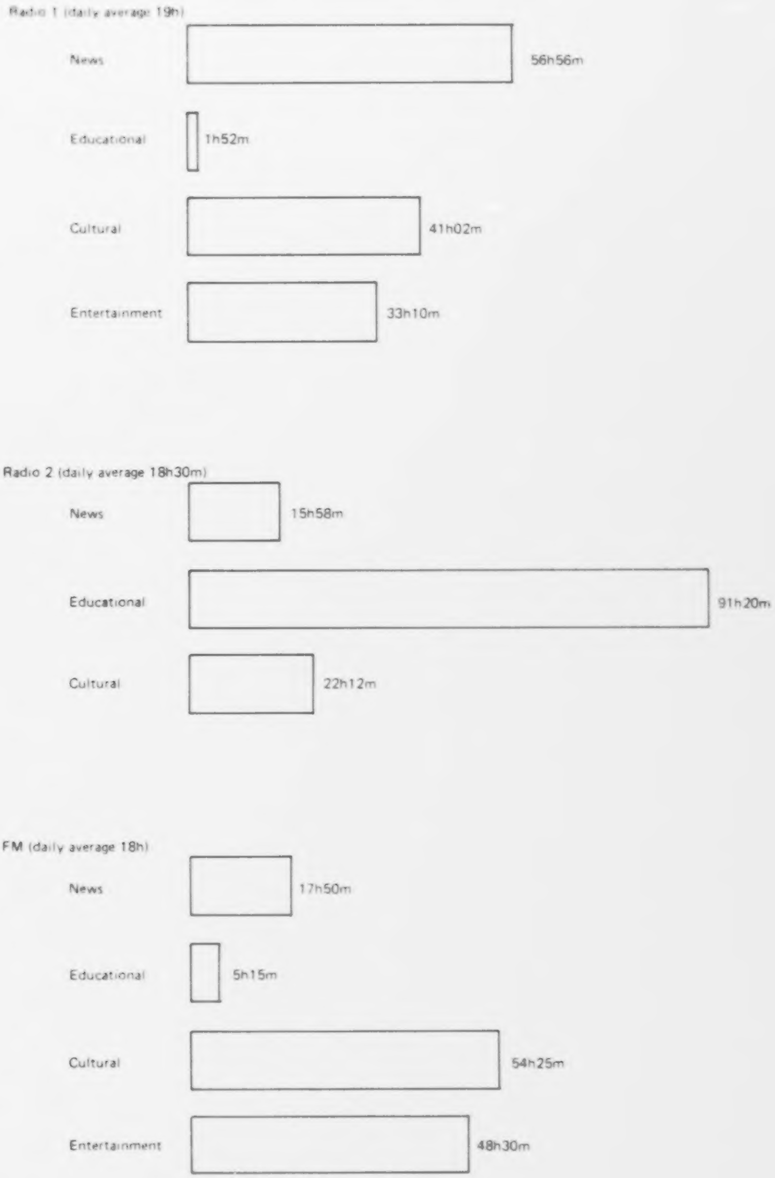


Figure 9: WEEKLY ACCESS RATE TO RADIO
(NHK 1986.3)

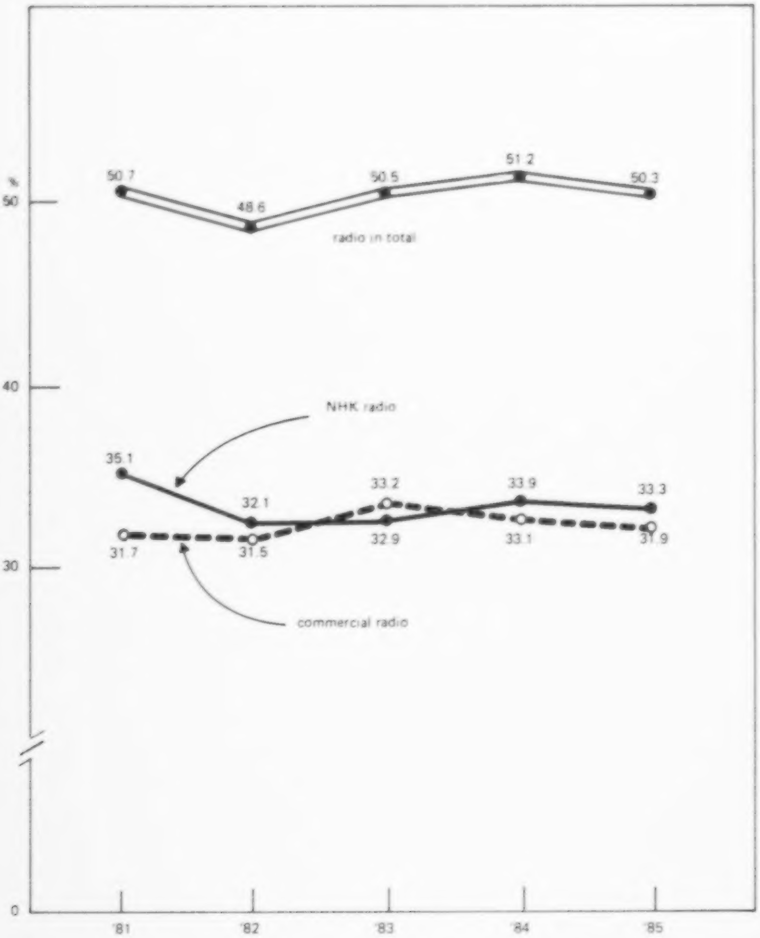
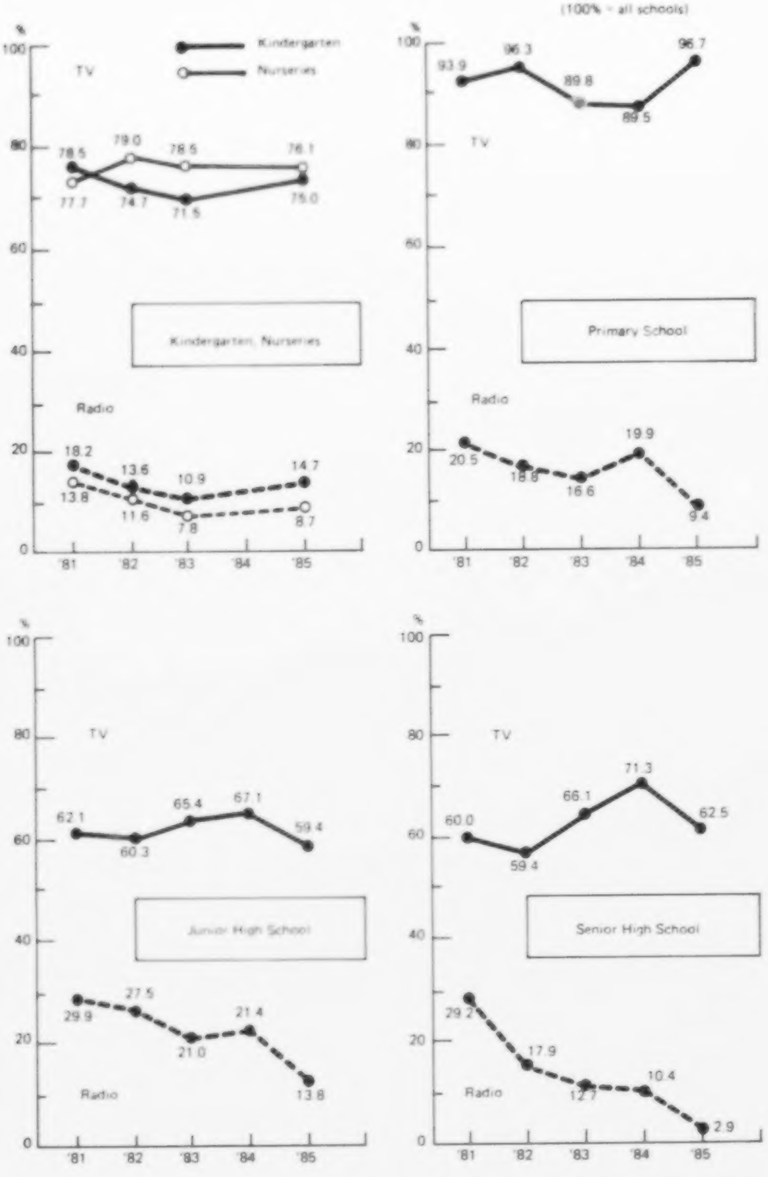


Figure 10: UTILIZATION OF RADIO AND TV IN SCHOOLS
(NHK 1986.4)



Fourteen hours of radio programs (including one repetition) are broadcasted weekly through NHK to students in the NHK Gaukuen correspondence high school. Bosei-High School also sponsors daily broadcast through FM radio programs in the early morning and evening for students. In the University of the Air, radio programs are broadcasted daily from six o'clock in the morning to midnight. In 1986, seven series for basic, nine for fundamental, 14 for foreign language, and 48 for senior courses are broadcasted.

In 1986, a series of four 30-minute educational radio programs and their tutoring programs are broadcasted for students in correspondence courses in private universities and colleges every Saturday and Sunday. There are courses in Literature, Law, Mathematics, Economics, Biology, Ethics, Sociology, Geology, Psychology, Philosophy and Geography. In 1986, eight national universities, i.e. Hokkaido, Tohoku, Niigata, Kanazawa, Nagoya, Osaka, Hiroshima and Kumamoto Universities, produced and broadcasted a series of 13 45-minute programs for university extension through commercial broadcast stations, supported by the National Institute of Multimedia Education.

As far as non-formal education is concerned, many educational radio programs for adults were broadcasted for approximately 100 hours weekly. According to a survey by NHK in 1985, two per cent of 2,753 samples answered that they studied through radio. Programs for English conversation, classic music, gardening, food, physical exercise, English were most popular. The rate of radio listening was higher in cultural fields than in other fields, compared with total adult study behaviors as shown in Figure 11. It is assumed that radio is well used for cultivating knowledge.

Radio was often utilized in distance education fields. But it lacks interactiveness to learners and visual presentation. Where there are no alternative powerful media, radio is a useful and convenient method for presenting information. In case one-way radio presentation is supported or supplemented by human tutorial or group discussion, it would be more effective.

B. Educational TV Broadcast

TV is one of the most powerful and effective media for teaching. The educational characteristics of TV is similar to that of radio, but visual images on TV make information clearer, more concrete and easier to understand. The Open University group listed down the following appropriate use of TV. The first five items are related to radio and TV.

(i) to increase students' sense of belonging; identification of and with course designers; making the teaching less impersonal;
(ii) to reduce the time required by students to master content from reading alone;
(iii) to pace students; to keep them working regularly; to break inertia of beginning to study in evening;
(iv) to recruit or attract new students; to interest general viewers on subject matter; and
(v) to establish academic credibility of course to "outside" world.

The following have been compiled as functions attributed to television:

(i) to demonstrate experiments or experimental situations;
(ii) to illustrate principles involving dynamic change or movement;
(iii) to illustrate abstract principles through the use of especially-constructed physical models;
(iv) to illustrate principles involving two-, three-, or n-dimensional space;
(v) to use animated, slow-motion, or speeded-up film or videotape;
(vi) to teach certain advanced scientific or technological concepts without the students having to master highly advanced mathematical techniques;
(vii) to substitute for a field visit;
(viii) to bring to students primary resource material, or case-study material;
(ix) to demonstrate decision-making processes;
(x) to change students' attitudes;
(xi) to bring students examples of films or television programs, where a critical study and analysis of film or television itself is the subject matter of a course;
(xii) to record special events, experiments, species, places, people, buildings;
(xiii) to explain or demonstrate practical activities;
(xiv) to condense or synthesize range of information into a coherent whole;
(xv) through performance, to demonstrate methods or techniques of dramatic production, or different interpretations of plays and novels;
(xvi) to teach sketching, drawing or painting techniques;
(xvii) to demonstrate how instruments or tools are played or used; and
(xviii) to analyze, through a combination of graphics and sound, the structure of music.

Figure 11: CHARACTERISTICS OF RADIO LISTENING (NHK 1985.4)

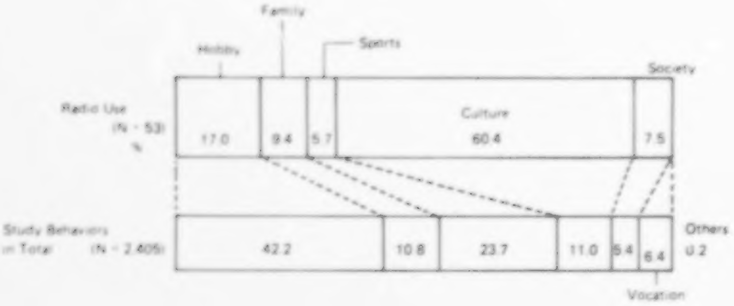
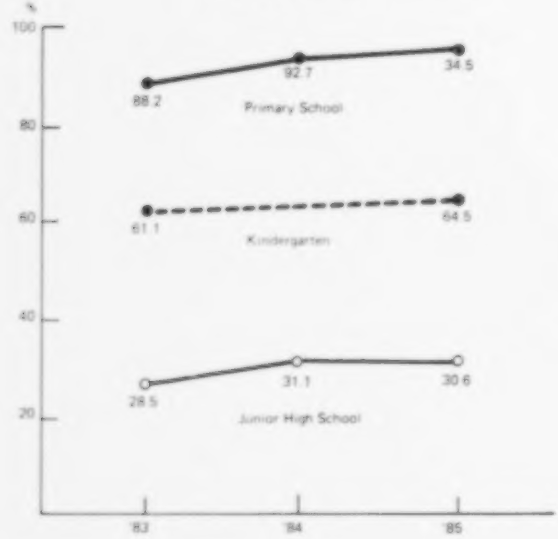


Figure 12: RATIO OF SCHOOLS HAVING TV MONITOR IN ALL CLASSROOMS

(100% = all schools)



Production of broadcasting programs with these points in mind is considered effective.

The diffusion rate of TV sets is 26 per cent to Japanese population. Almost every family has at least one TV set and also almost all schools have color TV as shown on Table 5. Some schools have TV sets even in every classroom as shown in Figure 12. Ninety-four-and-a-half per cent of elementary schools, 64.5 per cent of kindergarten and 30.6 per cent of junior high school have color TV sets in every classroom. The figures reflect the utilization rate of educational TV programs in schools as shown in Figure 10. At least once a year 96.7 per cent of teachers in primary school use at least one educational TV program. The figures are 76.1 per cent for kindergarten, 81.5 per cent for nurseries, 62.5 per cent for junior high schools and 59.4 per cent for senior high schools.[36] Table 6 shows the time schedule for ETV channels in NHK in 1986. [37] The six series of a 15-minute program are broadcast for kindergarten and nurseries: "Puppet show", "Can you do it?", "Hey, Hanimaru", "Friendly Rhythm", "Baku's Bag" and "Look at that!" in ETV channel. Also a 25-minute program for younger children, "With Mother", is broadcasted via GTV channel from Mondays to Saturdays every morning, and rebroadcasted every evening via ETV channel. Children are willing to watch those programs in kindergarten and nurseries. Even children as young as three years enjoy watching TV programs such as "With Mother", "Hey, Hanimaru", "Baku's Bag", and "Friendly Rhythm". Children sit in front of TV Monitor at the broadcast time and watch them together with their friends and teachers in their classrooms. After watching, they sometimes extend their activities related to the programs. They sing songs, make handicraft and create a story, following the scenes that appeared in the program. Table 7 shows the list of primary school TV programs.

The programs watched by the largest number of children are science, social studies and ethics programs. Almost all programs for junior and senior high schools are special series compiled with four to six programs, each 20-minute long, and most of them science and social studies programs. In addition, nine series for senior high school courses are broadcasted either early in the morning or late at night. These are 30-minute TV programs, e.g. Mathematics I, English I, History of Japan, History of the World, Science and Man, etc. These are one-year series for NHK correspondence high school students and rebroadcasted in daytime for regular junior high school use.

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[36] Akiyama, T. and Usami, S., "Trends in the Utilization of School Broadcasts", *NHK Report*, April 1986, pp. 2-17.

[37] NHK, *This is NHK*, Tokyo Audience and Public Relations Bureau, NHK.

Table 5 DIFFUSION RATES OF COLOR TV IN SCHOOLS (NHK 1986.4)

(100% = All Schools)

		Diffusion Rate	Average Number
	Kindergarten	95.8% (93.5)	4.4 (4.2)
	Nurseries	96.8 (95.5)	3.2 (3.1)
	Primary School	100.0 (100)	16.8 (16.6)
	Junior High School	99.8 (99.1)	9.5 (9.0)
	Senior High School	99.6 (99.0)	9.0 (9.0)
Special Education School	Blind	100.0 (98.5)	12.7 (13.4)
	Deaf	100.0 (100.0)	18.0 (19.7)
Special Care School	Retarded	100.0 (100.0)	15.0 (19.7)
	Physically Handicapped	100.0 (100.0)	14.4 (17.8)
	Weak	100.0 (100.0)	16.3 (15.7)

Table 6: Educational TV School Broadcast Schedule for 1986

Day Time	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	Day Time
A M	Science (P_s 2)	Science (P_s 1)	Japanese Language (P_s 1)	Social Studies (P_s 1)	Ethics (P_s 1)	Music (P_s 1)	A. M.
9 15	Look at That! (K)	Puppet Show (K)	Can You Do It? (K)	Hey, Hanimaru! (K)	Music (K)	Baku's Bag (K)	15 9
30	Social Studies (P_s 1)	Growing Up (P_s L)	Social Studies (P_s L)	Science (P_s 2)*	Music (P_s 2)*	Safety Education (P_s 3)*	30
45	Social Studies (P_s 4)	Science (P_s 3)	Ethics (P_s 1)	Music (P_s 3)*	Social Studies (P_s 3)*	Science (P_s 3)*	45
10	Music (P_s 3)	Japanese Language (P_s 1)	Mathematics (P_s 1)	Watching the World around Us (P_s L)	Science (P_s 1)*	Mathematics (P_s 2)*	10
15	Program for the Handicapped (P_s)	Program for the Handicapped (P_s)	Program for the Handicapped (P_s)*	Program for the Handicapped (P_s)*	Music (P_s 4)	Japanese Language (P_s 1)*	15
30	Puppet Show (K)	Can You Do It? (K)	Hey, Hanimaru! (K)	Music (K)	Baku's Bag (K)	Look at That! (K)	30
45	Science (P_s 4)	Social Studies (P_s L)*	Social Studies (P_s 5)	Science (P_s 5)*	Science (P_s 5)*	The Human Family (P_s 2)*	45
11	Music (P_s 1)	Japanese Language (P_s 2)	Music (P_s 2)	Mathematics (P_s 1)*	Japanese Language (P_s 6)*	Watching the World around Us (P_s 2)*	11
15	Social Studies (P_s 3)	mathematics (P_s 2)	Safety Education (P_s L)	Japanese Laguage (P_s 2)	Social Studies (P_s 6)*	The Green Earth (P_s H)*	15
30	Social Studies (P_s 3)	The Human Family (P_s 1)	Science (P_s 4)*	Science (P_s 3)*	Good Friends (P_s 1)*	Making the Most of Your Junior High School Days	30
45	Social Studies (P_s 6)	Science (P_s 5)	Science (P_s 5)*	Ethics (P_s H)*	Social Studies (P_s 5)*		45
P. M.	**Special Series for Senior High Schools**					Notes on my Youth	P. M.
	World Geography	Geography of Japan	Science Div *	Science Div 1 *	Science Div 2 *		20
0 20	**Special Series for Senior High Schools**						30
	Biology	Physics	Geology	Geology	Japanese History		
40							40
1 10	**Special Series for Junior High Schools**						1 10
	Science Div 1	Science Div 1	Science Div 2	Science Div 2	Computers		
30					School ed		30
35	**Special Series for Junior High Schools**						35
	History I	History II	World Geography	Geography of Japan	Citizenship		
55	Five-minute Dictionary (Mon., Wed., Fri.) Children's Pictures (Tues., Thurs.)						55
2	Ethics (P_s H)	Music (P_s 4)	Science (P_s 5)	Social Studies (P_s 4)	Science (P_s 4)		2
15	Science (P_s 6)	Social Studies (P_s 5)	Social Studies (P_s 6)	The Green Earth (P_s H)	The Human Family (P_s 1)		15
30	**Senior High School Course**				(School ed.)		30
	History of Japan	World History	Introduction to the Classics	Science in Our World	How People Live around the World		
3	Music (K)*	Baku's Bag (K)*	Puppet Show (K)*	Can you Do It? (K)*	Hey, Hanimaru! (K)*		3
15							15
P. M. 7–7 30	Senior High School Course						P. M. 7–7 30
11 11 30	Senior High School Course						11 11 30

NOTE K – For Kindergarten and Nursery School
P_s – For Primary School
P_s-L – For Primary Lower Grades
P_s-I – For Primary Intermediate Grades
P_s-H – For Primary Higher Grades
J – For Junior High School
1 6 – Grade of School
* Rebroadcast

Table 7: Utilization Rate of ETV in Primary Schools

		100 per cent = all schools Utilization Rate (%)
Japanese language	Fairy Tales Room	46.3
	A, I, U, E, O	21.9
	Land of language	13.0
	Na, Ni, Nu, Ne, Note	6.8
Social studies	People in family and school	58.6
	Workers	61.3
	Exploration to our town	42.1
	Our life	51.1
	TV journey	49.3
	History of life	60.5
Arithmetics		
1, 2 and Arithmetics	21.5	
Easy arithmetics	13.7	
World of numbers	9.9	
Science		
Science class primary 1	73.8	
2	68.5	
3	69.7	
4	65.9	
5	65.0	
6	62.3	
Music		
One, two, don	40.2	
Sing, go!	38.4	
Pipe sing - o	32.5	
Moral Education		
Growing children	68.4	
Everybody friends	65.7	
Wonderful friend	68.8	
Others		
Gazing eyes	15.2	
Green glove	8.3	
Expanding classroom	8.1	
Safety not of Pyonta	21.0	
Special education		
Enjoy classroom (lower grade)	26.4	
Enjoy classroom (upper grade)	21.4	
Teacher		
Time for teachers	27.5	

Regarding the effects of TV programs, teachers in elementary schools mostly consider them as motivating children to study. Teachers utilize TV programs as supplementary materials to their classroom teaching.

The abovementioned situations concern the use of ETV in formal school education settings.

In terms of formal distance education, TV programs are utilized in NHK correspondence high school and the University of the Air. Eleven hours (including one repetition) of TV programs called senior high school course are broadcasted for students of NHK Gakuen Correspondence School. These programs are naturally watched by ordinary high school students and others.

The University of the Air is also widely using ETV for instruction.[38] One hundred eighteen courses are studied by 102 series of 15 to 45-minute ETV programs once a week and 16 series twice a week. The rates of students who got credits after the first academic term in 1985 are as follows: 66.2 per cent (5,400 out of 8,159) for degree students, 38.6 per cent (2,271 out of 5,891) for part-time study students, 25.8 per cent (456 out of 1,768) for subject study students and 48.6 per cent (594 out of 1,222) for special study students. But the rates of these to total number of students who enrolled in lecture subjects at the beginning of the first academic term are as follows: 38.5 per cent, 26.7 per cent, 20.6 per cent and 26.4 per cent, respectively. In the first year of the University of the Air, 67 per cent of 1,022 respondents to the survey by the National Institute for Multi Media Education watched and listened to broadcasting programs between 9:00 p.m. and 12:00 midnight.

Radio and TV are also utilized in the university extension courses. In 1986, 11 series of 13 to 45-minute TV programs are produced and broadcasted through local broadcast stations by 11 national universities, such as abovementioned eight universities in terms of radio and Shinshu, Kochi and Ryukyu Universities. In 1985, a total of 6,352 students participated in the university extension programs run by ten national universities. According to replies to the questionnaire by 49.5 per cent of 3,620 students in 1983, 46.2 per cent watched and listened to over 80 per cent of the TV and radio programs.

Concerning non-formal education, NHK also produces and broadcasts ETV programs for adults.[39] These are for teachers, for parents and for adults in general. The TV program series for parents called "Mothers's Study Room" is broadcasted every day from Monday to Friday for 25 minutes in the afternoon on ETV channel and rebroadcasted in the morning on GTV channel. In 1984, 191,442 mothers got together to discuss this series of ETV programs in 2,833 social education projects supported by NHK and local education authorities. This figure is nearly half of the total number of social education projects using television (5,526) and participants (401,750). A series "Time for Teachers" is also broadcasted for school teachers.

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[38] UA, The University of the Air, 1985.

[39] Ogushi, T., "By What Methods Do Adults Learn?", *NHK Report*, April 1986, pp. 34–49.

Social education programs are classified into four general types as assumed in Table 8.

(i) General culture course;
(ii) Courses on hobbies or for practical application;
(iii) Language courses; and
(iv) Welfare-oriented programs.

These TV programs are broadcasted for approximately 100 hours weekly and early in the morning or in the evening every day. Among them, gardening, golfing, fishing, Go-play and English conversation are the five best watched programs, though the viewing ratios are very low: 3.6 per cent, 1.1 per cent, 0.9 per cent, 0.7 per cent and 0.5 per cent, respectively, according to the NHK survey.

C. Audio and Videotape Recorder

Audio and videotape (cassette) recorder can record, keep and playback auditory or audiovisual information. We can gain information at any time we like and for any duration we like, and repeat as many times as we like. As we can control place, timing and amount of learning by ourselves, audio and videotape recorder would be useful and convenient for distance education. Workers and busy students can study their subjects at their own place and at their convenience, if the suitable education software is reached by transportation.

School teachers can produce integrated audio and video software and use them in their classroom both in group and individual teaching.

Concerning the content suitable for audio and video software, almost all kinds of information such as resource materials, description, instruction, poem reading, drama, arts, music, picture and so on can be recorded and utilized. Nowadays as the cost of machines is getting reasonable, all schools of Japan have audiocassette tape recorder and almost all families have audiocassette and 73.6 per cent of families have radio cassette recorders in 1985. Almost all schools have color VTRs as shown in Figure 13, i.e. 85.6 per cent in primary, 96.0 per cent in junior

Table 8: EARLY AND LATE EVENING PROGRAM SCHEDULE FOR EDUCATIONAL TELEVISION
(As of April 1985)

		MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
p.m.		Together With Mother*						Are you keeping fit?*
	25	Songs for Everyone						
5	30	Notes on My Youth*	Going All-Out*	Talk on Children's Development*	Senior Citizens' Seat*	Tomorrow's Welfare	Hobby Course*	The Wage-Earner's Life (New Series)
		Russian Course*	Spanish Course*	Russian Course*	Spanish Course*	Hobby Course*	Hobby Course*	
6	30	Chinese Course*	English Conversation I*	Chinese Course*	Korean Course*	English Conversation I*	Hobby Course*	For Those With Hearing Difficulties
		Senior High School Courses*						Hobby Course*
		Math I	English I	Math I	English I	Biology	NHK Symphony Orchestra Hour	
7	30					Gardening for Pleasure*		Women's Encyclopedia*
	55					Classics Alburm		
8		ETV 8					Overseas Documentary	Sunday Art Gallery*
	45	Television Column					Television Symposium etc. (Discussions With Important People)	
9		Today's Menu*				Selection of Japanese Classical Music		World Masterpiece Theater (Shakespeare Theater, etc.)
	25	Family Journal						
	45					Lively People		
10	15	NHK Citizen's University						
	30						YOU	
11		Senior High School Courses*						
		Japanese History	World History	Invitation to the Classics	Science and Mankind	The World: Its People and Their Lives		
	30	French Course*	German Course*	English Conversation II*	French Course*	German Course*	Today's Menu*	
	55						Mini-Program	

Figure 13: COLOR VTRs IN SCHOOLS (NHK 1986.4)

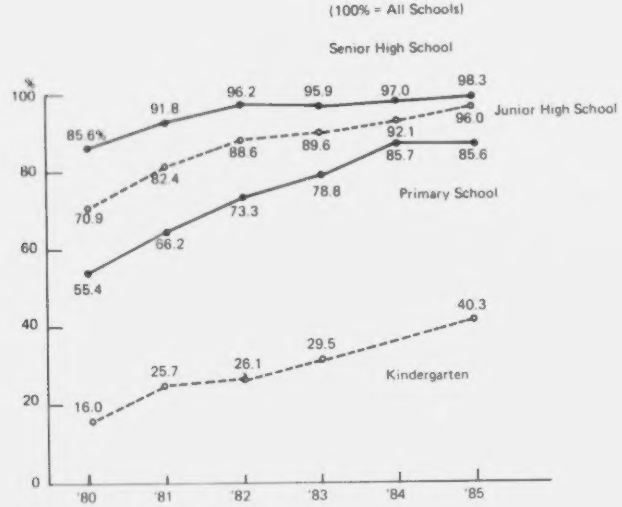
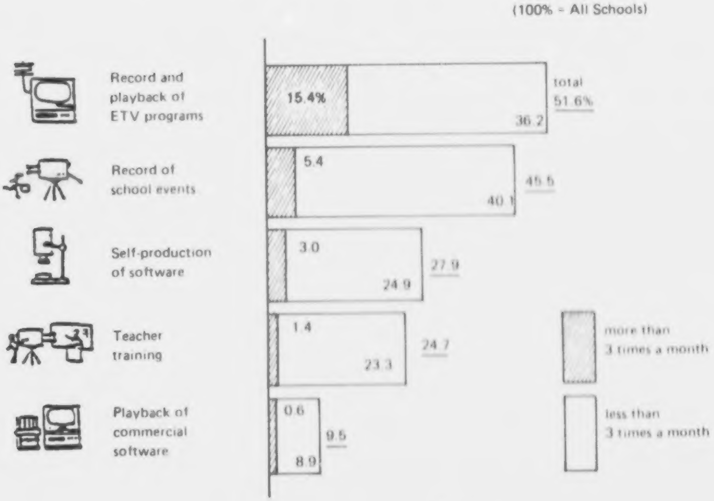


Figure 14: PURPOSE OF UTILIZING VTR IN PRIMARY SCHOOL (1982)



high and 98.3 per cent in senior high schools in 1985. Also, 27.8 per cent of Japanese households have their own VTRs in 1985. Figure 14 shows that these VTRs are utilized for recording and playback of TV program in 51.6 per cent of primary schools, for recording school events in 45.5 per cent, for producing self-made video software in 27.9 per cent, for teacher training in 24.9 per cent, and for playback of commercial video software in 9.5 per cent in 1982.

Figure 15 shows the utilization rates of ETV programs, GTV programs and videotaped ETV programs and also the ratio of teacher-made video software and commercial video software stocks in Japanese schools. In every level of school, the ratio of teacher-made video software has been increasing these years and the ratio of videotaped ETV program stocks has also been increasing. In 1985, the ratio of videotaped ETV stocks and of teacher-made video software in junior and senior high schools is higher than the ratio of ETV utilization. This means that primary school teachers are usually using ETV programs, but secondary school teachers have more opportunities for using videotaped software.

In 1985, the ratio of schools which used videotaped ETV programs was 14.7 per cent in kindergarten, 36.0 per cent in primary, 97.4 per cent in junior high and 99.7 per cent in senior high schools. But schools which used ETV broadcasting programs were 96.2 per cent in kindergarten and 96.8 per cent in primary schools.

In Japan, primary school teachers teach all subjects to their own class, but secondary school teachers teach their special subject to many different classes. Therefore, in secondary schools, the diffusion of VTR is very important to promote the use of ETV programs. VTR can overcome the time constraints from the broadcasting schedule. The number of new commercial video software produced in 1985 totalled 2,136 of which 382 was educational and the amount of selling was $2.3 million of which 8.3 per cent was educational.

Table 9 shows the number of video software in schools. In primary schools, 20.5 per cent have 1 to 10 video software, 20.3 per cent have 11 to 20, and 24.5 per cent have 21 to 50. In junior high schools, 13.7 per cent have 1 to 10, 13.2 per cent have 11 to 20, 28.1 per cent have 21 to 50 and 17.4 per cent have 51 to 100. In senior high schools, 25.2 per cent have 21 to 50, 21.9 per cent have 51 to 100, and 13.9 per cent have 101 to 200. The content of video software is scattered to all subject matter from Japanese language to *Ethnics*. Some teachers have VTRs in their homes and they use the videotaped TV programs in schools. The percentage of schools which have those teachers was 42.5 per cent in primary, 55.8 per cent in junior high and 81.9 per cent in senior high schools.

Figure 15: RATIO OF MEDIA STOCK

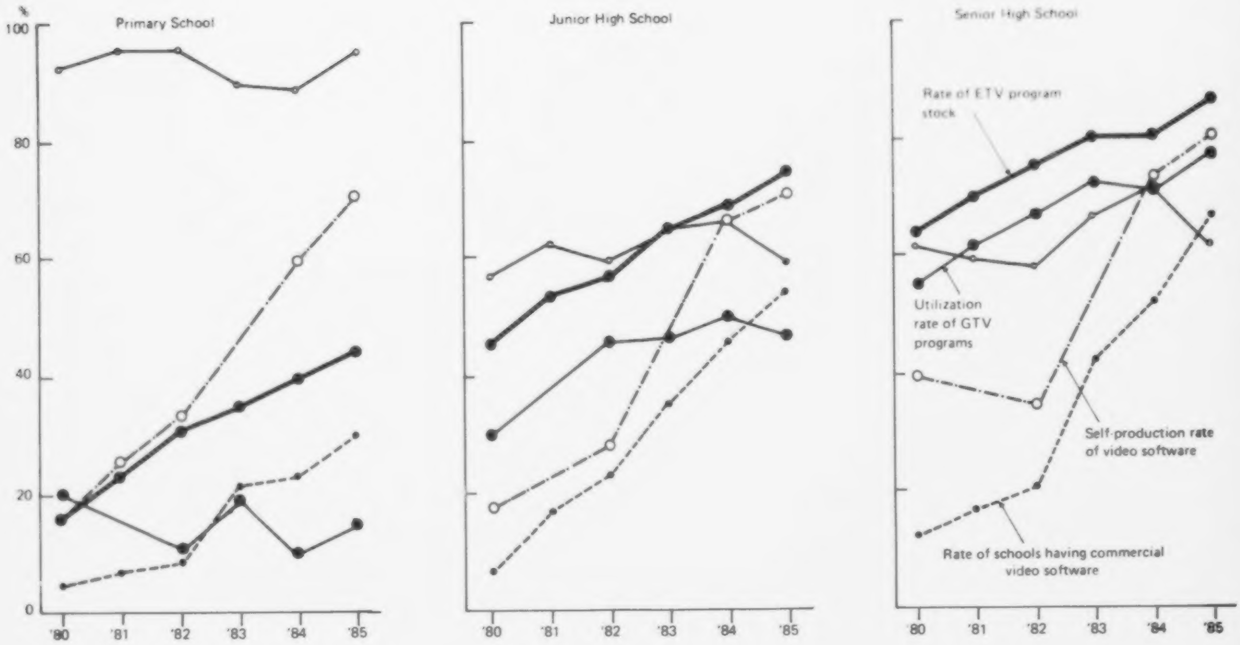


Table 9. THE NUMBER OF VIDEO SOFTWARE IN SCHOOLS (1984)

100% = All Schools

		1 ≀ 10	11 ≀ 20	21 ≀ 50	51 ≀ 100	101 ≀ 200	201 ≀ 500	501 ≀ 1000	1001
Videocassette	Primary School	20.5%	20.3	24.5	9.0	3.2	1.3	0.4	0.1
	Junior High	13.7	13.2	28.1	17.4	10.0	4.3	0.9	0.3
	Senior High	7.9	8.7	25.2	21.9	13.9	12.1	2.7	1.1
Videocassette for Old ETV	Primary School	25.4	4.7	5.3	1.8	0.6	0.7	–	0.1
	Junior High	21.3	14.5	15.8	7.5	5.5	2.1	0.3	0.1
	Senior High	19.3	14.6	17.7	13.5	7.1	5.7	1.7	0.5
Commercial Video Software	Primary School	16.6	3.7	2.2	0.4	–			
	Junior High	28.0	9.9	5.6	1.6	0.1			
	Senior High	32.2	10.3	6.2	1.1	0.1			

In the University of the Air, all six study centers have audio and videocassette tapes for all series of radio and TV broadcast programs and serve them for reviewing. 0.3 to 3.2 per cent of students recorded radio programs or 0.9 to 5.7 per cent recorded TV programs for their home study.

Also the National Institute of Multimedia Education[40] produced video software for teacher training with the cooperation of university professors. These are now in the market and utilized in more than 100 universities in 1986. The cost of audio and videotape recorder is getting cheaper. Now we can get a radio cassette player with not more than $80 and a videocassette player with not more than $500.

D. Compact Disc (CD) and Videodisc (VD)

CD is originally a new medium for playing music. The size is five inches and very compact, but the quality of the sound is excellent. When we playback CD by CD player, this medium is useful for music education and will also be used as a medium for external computer memory device in the near future. As CD can also record still picture, it may be useful for visual database.

VD is also a medium for recording audiovisual image. We can get both still and moving pictures clearly. There are two types of VD. One is optical recording LD and another is magnetic recording VHD.

Memory capacity of VD is to store 54,000 still pictures and approximately 30-minute moving picture. When we record picture books or encyclopedias, it would be convenient to use electro encyclopedia or database. Unfortunately the cost for producing CD and VD is expensive. Users cannot make them by themselves. In Japan, approximately 7 per cent of schools have VD players in 1985. Some educational software for VD are in the market.

The average number of VD which schools have is 5.5 in primary, 13.6 in junior high and 17.5 in senior high schools. Concerning the rank order in the utilization rate of VD, VD for social studies is the first place and then physical exercises, science, special activities and music follow in primary schools. In junior high schools, the order is social studies, science, music and physical exercises. In social studies, science and physical exercises, teachers use VD for demonstration and repetition by random access function. In senior high schools, teachers use VD for music, social studies, science, special activities, physical exercises, foreign language and vocational education. All VD are commercial software at the moment. The cost is not more than $900 for VD players and $80 for a VD. In 1985, total number of new VD was 1,875 of which 80 was educational and total amount of sales was about $5 million of which only 1.6 per cent was educational.

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[40] NIMME, *National Institute of Multimedia Education*, 1984.

E. Microcomputer and Educational Software

Microcomputers are useful tools for education. They play teachers' teaching roles because they conduct three-way communication. Microcomputers are utilized for individual instruction in remedial teaching, home studies and independent studies. It is easy for users to understand educational information by graphic and clear color presentation in microcomputer. We can also get suitable information immediately by database and information retrieval. Microcomputers can help users' activities in study such as drill and practice, tutorials, problem solving, educational games, simulation and information retrieval from the database.

Microcomputers are used in 2 per cent of public primary schools, 13 per cent of public secondary schools and 81 per cent of public high schools, according to a survey conducted in October 1985 by the Japan Society for the Promotion of Educational Technology on commission from the Ministry of Education, Science and Culture (Table 10). The difference in the percentage among different types of schools is much greater than in the case of word processors and videodiscs.[41]

How are computers used in schools at present? As far as schools' owning one or more microcomputer is concerned, the number of computers per school averages four in primary schools, three in secondary schools and ten in high schools. Computers are used for classroom instruction and for school management. In every type of school, they are used more for school management than for classroom instruction: 84 per cent and 55 per cent in primary schools, 95 per cent and 39 per cent in secondary schools and 94 per cent and 66 per cent in high schools, respectively. This is because school management does not require a large number of computers, takes over much of the teachers' workload and increases the efficiency of school administration work.

How are computers used for classroom instruction? In primary schools, they are used most for arithmetic, extracurricular activities, science, Japanese and social studies, in this order. In secondary schools, they are used most for extracurricular activities, mathematics, science, foreign language and manual training, in this order. In high schools,

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[41] Sakamoto, T., *Educational Computing in Japanese Schools*, 21st ICAP, Jerusalem, 1986.

Table 10 DIFFUSION RATE OF NEW MEDIA IN SCHOOLS (1985)

School	Word Processor	Videodisc	Micros
Primary N = 24,804 (96%)	1,795 7.6%	1,558 6.6%	483 2.0%
Secondary N = 10,314 (99%)	1,458 14.3%	736 7.2%	1,296 12.7%
High N = 3,853 (99%)	1,764 46.1%	298 7.8%	3,101 81%

Table 11 USES OF COMPUTERS FOR SCHOOL MANAGEMENT IN PUBLIC SCHOOLS

%	Primary Schools	Secondary Schools	High Schools	Vocational or Special High Schools
Educational Planning, Instructional Design	42.9	34.6	33.4	58.2
Instructional Guidance, Diagnosis and Evaluation	22.6	11.7	15.7	14.2
Data Processing for Achievement Scores	40.7	78.4	90.7	86.4
Guidance, Health Diagnosis	33.7	66.1	67.1	51.5
School Administration	35.7	36.6	32.9	31.8
Other Uses	30.8	28.2	16.2	20.8

computers are used for information science, extracurricular activities, vocational training, mathematics and science, in this order. It is presumed that students are instructed in computer itself during extracurricular activites and classes for information science and vocational training and that, in other ordinary subjects, computer is not a subject of study but is used as an aid to instruction.

Microcomputers are used for classroom instruction either to teach ordinary subjects more effectively or to teach computer-related subjects. In the former, microcomputers are used: (i) to present teaching materials in the manner of audiovisual education; (ii) to teach pupils individually through CAI; and (iii) to facilitate various activities in school studies.

Firstly, microcomputers are used in a conventional classroom setting to present materials in the manner of an OHP or VTR. The teacher uses a microcomputer, for example, to simulate natural and social phenomena for demonstration in science and social studies. In mathematics, a computer is used to demonstrate how the change in a variable affects the result of a mathematical formula (which is graphically represented).

Secondly, microcomputers are widely used for CAI Programs for CAI in the form of drills and explanations are either prepared by teachers or obtained from the market. They can be used effectively as homework, supplementary exercises and as materials for a multiple class and for slow learners. It is rather a common mistake to believe that CAI is the only way microcomputers are used for educational functions.

Thirdly, microcomputers are used to facilitate various tasks involved in school studies such as calculating the results of a science experiment and representing them graphically, collecting and compiling data for social studies and writing reports on a word processor. Computers used in this way will help students develop their ability to handle information.

The various uses of computers for school management are shown in Table 11. The use of computers for data processing of achievement scores and for guidance increases with the rising level of school. It is notable that 43 per cent of primary schools use computers for educational planning and instructional design.

Teachers pointed out the following positive and negative effects of the use of computers for education.

1. Educational effect of computers

Microcomputers have positive effects on education such as developing the students' problem-solving ability, logical thinking ability, self-teaching ability and information-processing ability; providing individualized education; motivating students toward learning; allowing newly-acquired knowledge to sink in and develop; and helping slow learners to catch up with others. On the negative side, computer education is said to be of little help in developing the students' basic thinking ability, problem-solving ability and creativity.

2. *Educational system, curriculum, environment*

It is difficult to introduce microcomputers into the present educational system or curriculum. There are too many students in a class for effective computer education.

3. *Method*

The educational effect of using computers and teaching methods is not clearly defined.

4. *Personnel*

Schools are lacking in trained personnel and must be provided with outside technicians and experts.

5. *Teaching Staff*

There is little common understanding among teachers. The research or management system for computer education is not established. There is a lack of experts.

6. *Facilities*

Teaching materials, facilities and the space for computer education is lacking.

7. *Hardware*

Computers are difficult to operate, not educationally useful, subject to frequent remodeling and not interchangeable.

8. *Software*

The curriculum, courseware and software for computer education are inadequate. Software is too time-consuming to prepare, too expensive, uninterchangeable and not readily available.

Various experimental studies have been made in primary, secondary and high schools. The Shinjo Secondary School in Nara Prefecture, for example, teaches programming in a classroom equipped with microcomputers, one for each student. In Takezono-Higashi Primary School in Tsukuba and Kohoku High School in Tokyo, there is a microcomputer for every student to be used for CAI. In schools, which do not have a sufficient number of computers, a single computer is shared by several students. Children in Den'enchofu Primary School and Shimizukubo Primary School in Tokyo use Logo (a programming language) to draw pictures. A group of schools in Musashino, Tokyo, share 20 computers among themselves and use them by turns for CAI. In Konan Primary School in Himi City, Toyama Prefecture, children are learning to solve problems using Logo. Yukigaya Primary School in Tokyo had an internal information network system using word processors. Asahi City, Chiba Prefecture, has a local educational information system. Computers are used for CMI in quite many high schools.

CAI, mainly for mathematics and English, will be introduced in secondary schools with a sufficient number of computers. In schools with a small number of computers, CAI will be used for advanced students and slow learners.

The increased use of microcomputers in schools will be accompanied by the dissemination of word processors, computer networks, interactive videodiscs and computer communication.

Word processors, in particular, will be disseminated rapidly and used for writing compositions, editing classroom and school newspapers, issuing notifications, preparing supplementary materials, drafting examination problems and commenting on student compositions.

There are some difficulties in microcomputer use in education. First, the cost for purchasing hardware is expensive. It costs $3,000 for CPU, display, disc drive devices and keyboard. Second, there are few good quality softwares. Third, there is a wide range of incompatibility of softwares and educational softwares with different systems. Fourth, there are few experiences in using microcomputers in classroom teaching.

Recently, family computers are widely sold all over Japan. The number of production per year is nine million units. They are used mostly as game machines but Fukutake Book Company[42] developed special interface and combined family computer, home TV as display, and cassette tape as device for educational software. Sound comes from audiotape and graphic animation is also available. The cost is rather cheap. New educational softwares for Japanese language, social studies, arithmetic and science are produced every month and utilized by correspondence students of primary fourth and fifth grade level among its 900,000 correspondence study children. This is actually the simplest and cheapest CAI system. The cost of family computer is approximately $80 and that of interface is about $150. The total cost is only $230 if there is a TV set at home.

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[42] Fukutake, S., *Fukutake's Correspondence Education System and Audiovisual Education System*. Tokyo, Fukutake Publishing, 1985.

F. Telephone and Tele-Learning System

Telephone is widely used in distance education. It is especially useful for tutoring and counselling individuals. It is also available for group teaching if we use loudspeakers. In the US, teleconference and teletraining systems are often utilized mostly for in-service vocational training. For example, the Educational Telephone Network (ETN) in the University of Winsconsin, Tele-Tech in AFIT, Ohio and teletraining systems in American Airlines, CDC, Honeywell, IBM and AT&T are well known.

The Open University in the UK also developed the Cyclops System which used telephone lines for voices and, in addition, SSTV for still pictures. It was a sort of electric board connecting study centers and OU headquarters. Tokyo Institute of Technology also utilized three telephone lines for interactively transmitting voices, handwritten characters and still pictures between two campuses at a 30 km distance. Voices via telephone were amplified by a loudspeaker, handwritten characters were shown on a TV monitor via overhead camera. The professor's face and materials were shown as still pictures on another TV monitor via SSTV. However, these two projects were interrupted after experimental use.

Recently, JMA (Japan Management Association)[43] started to conduct Tele-Learning College for in-service industrial education. The system can reciprocally transmit voices and visual images via two telephone lines for interactively transmitting voices, handwritten characters and still pictures between two campuses at a 30 km distance. Voices via handwritten images with three colors on electric boards are simultaneously transmitted from the telecasting center to study centers in different industries via NTT Tele-Conference Network as shown in Figure 16.

JMA transmits four courses from 6:00 p.m. to 7:30 p.m., respectively, on different days of the week for 12 weeks. The subjects are

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[43] JMA, *Tele-Learning College*, Tokyo, Japan Management Association, 1986.

"Innovation practices for managers", "Fundamentals of AI", "New techniques on biotechnology" and "Fundamentals of electronics". An average of ten to 15 learners in one study center or more than 200 people in 12 different industries are studying by this system. The cost of the system is approximately $10,000 for purchasing terminal equipment and devices (half price for monochrome video devices) and telephone fee is added. Tuition fee and cost for textbooks are also needed. The average assumed cost for one person and one course is about $230 in the Tokyo area, and much more in other places. This set of tele-training system is useful for distance education but there are some problems. When many learners want to ask questions simultaneously, it is rather difficult for one person to be selected as a representative. As the lecturer is not seen on TV, he should continuously describe his behavior such as "picking up dropped piece of chalk", "intending to delete characters and figures on the electric board", "looking for lost materials" and so on. The audience may usually feel restless if they have idle time without visual movement and auditory stimulus.

But it would be a good medium for distance education if the cost of telephone would be reasonable and the telephone line network is widely diffused. In Osaka, JMA uses one telephone line system where the cost for telecommunication is reduced to one-half.

In 1985, Fukutake Book Company used dial access audiotape system and ANSER (Automatic Answer Network System for Electronic Request). When students input answers to questions mailed by postal service directly either by pushphone or by voice, they can receive correct answers, scores and KR messages immediately by synthesized voices. Eighty per cent of students enjoyed the quick responses.

Telephone lines are also utilized for using facsimile, videotex and microcomputer communication as will be described later.

G. Facsimile (FAX)

FAX is also useful for distance education because it can transmit visual images such as Chinese characters, tables, figures and drawings via telephone line. In 1984, the number of FAX installed in Japan is 730,000 as shown in Figure 3.10. The largest size of use for FAX is undertaken in the First Stage Common University Entrance Examination. Every year in January, approximately 350,000 high school leavers take this examination in order to enter the national universities. The National Center for University Entrance Examination sets nearly 100 (97 in 1986) miniFAXes and national universities and other examination places set approximately 400 (400 in 1986). As the examination is conducted

Figure 16: CONFIGURATION OF TELELEARNING IN JMA

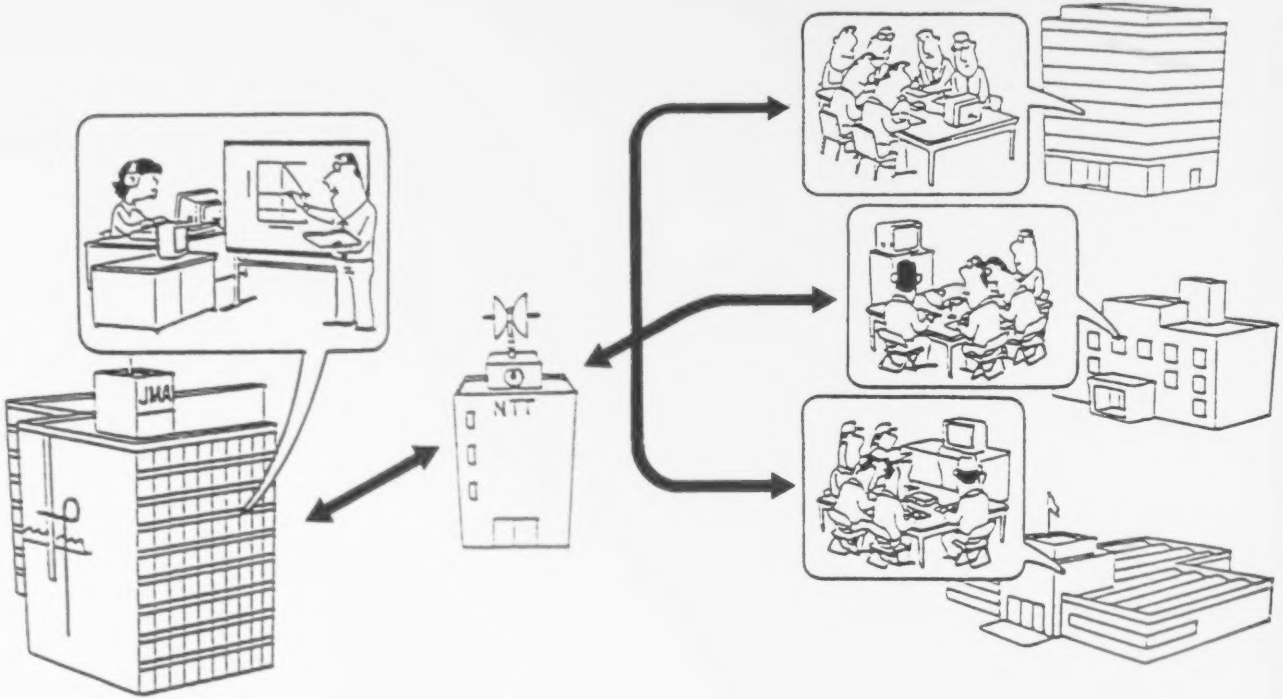
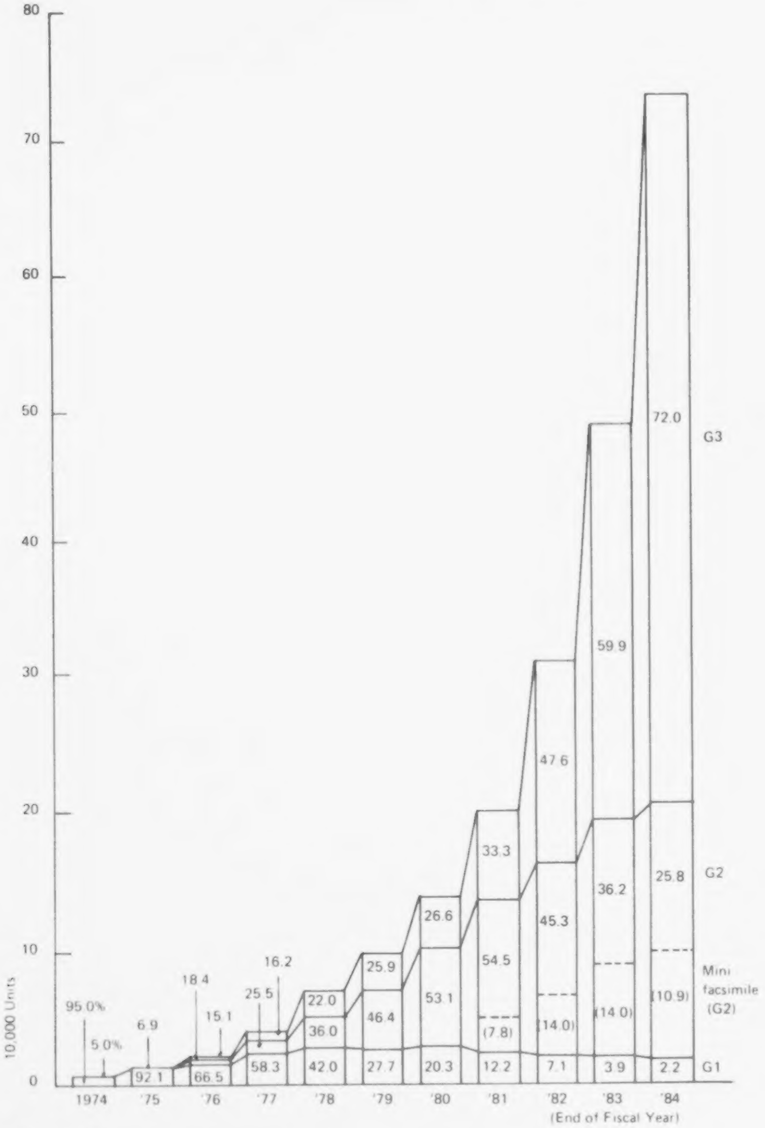


Figure 17: CHANGE IN NUMBER OF FACSIMILE SYSTEMS USING TELEPHONE NETWORK



Source: NTT

Note: G2 includes mini facsimile systems after fiscal 1981. Figures in bar graphs show percentages by type of system.

simultaneously all over Japan, we need immediate communication from the center to all examination places on emergency such as correction of questions and treatment of accidents by traffic troubles.

FAX is also utilized for the campus information optical network system in Tokyo Institute of Technology as will be described later. There is one FAX each in two lecture rooms, two conference rooms and 29 tutorial rooms. We can exchange printed information by FAX.

Some private coaching schools are conducting correspondence teaching using FAX. A rental FAX is placed at each student's home and connected to the one in the private school headquarters via telephone line. Questions and answers, correction of paper and study guidance are undertaken by this system.

The University of the Air started to use FAX for tutorials to individual students. In the 11 courses such as English, French, Management and Administration, Dwellings and so on, 1,300 students can use this system. Professors are staying in the study center or headquarters on a special day of the week and respond immediately to questions from students by FAX.

The number of public FAX is now increasing (8,000 in 1985 and 18,000 in 1986) in Japan and the communication fee is not so expensive (and $1 for handling). As the cost of FAX is now approximately $2,000 or more and the fee for lease is $600 per month, it would still be rather expensive for individual use. But if a study center has one unit, it could be useful for students to transmit any message through public FAX nearby.

H. Videotex

Videotex is a sort of service for providing character and visual information on TV display from the computer in the information center via telephone line according to the user's request. Videotex is now experimentally or actually utilized in more than 30 countries in the world. There are three different systems: CAPTAIN[44] (Character and Pattern Telephone Access Information Network), NAPLPS (North American Presentation Level Protocol Syntax) and CEPT (Conference Europeene des Postes et Telecommunications). Figure 18 shows the CAPTAIN system configuration.

Compared with code transmitting methods in Alphamosaic method for CEPT and Alphageometric method in NAPLPS, Hybrid transmitting methods using both code and pattern transmitting in Alphaphotographic method in CAPTAIN can display two sorts of Japanese and

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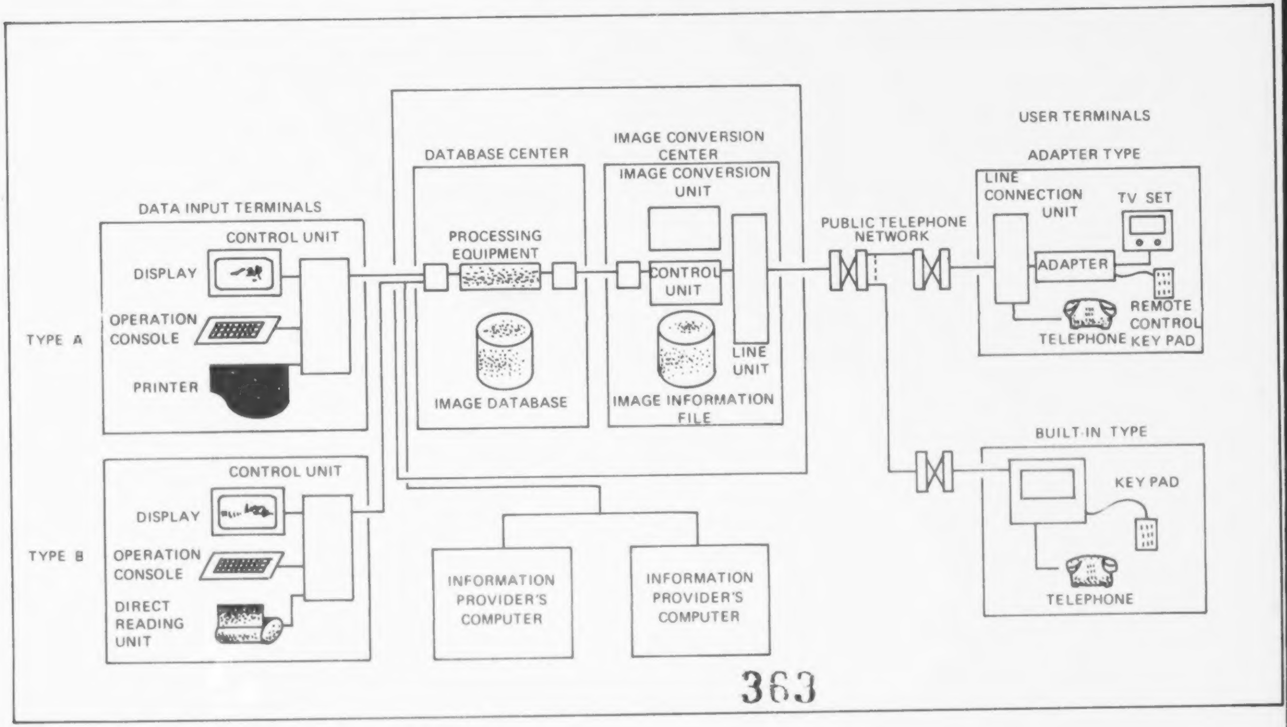
[44] NTT, *CAPTAIN*, Tokyo, Department of Technology, NTT, 1985.

Figure 18: CAPTAIN SYSTEM CONFIGURATION


DATA INPUT TERMINALS
TYPE A
CONTROL UNIT
DISPLAY
OPERATION CONSOLE
PRINTER
TYPE B
CONTROL UNIT
DISPLAY
OPERATION CONSOLE
DIRECT READING UNIT
DATABASE CENTER
PROCESSING EQUIPMENT
IMAGE DATABASE
IMAGE CONVERSION CENTER
IMAGE CONVERSION UNIT
CONTROL UNIT
LINE UNIT
IMAGE INFORMATION FILE
INFORMATION PROVIDER'S COMPUTER
INFORMATION PROVIDER'S COMPUTER
PUBLIC TELEPHONE NETWORK
USER TERMINALS
ADAPTER TYPE
LINE CONNECTION UNIT
TV SET
ADAPTER
TELEPHONE
REMOTE CONTROL KEY PAD
BUILT-IN TYPE
KEY PAD
TELEPHONE

Chinese characters in addition to alphanumericals and signs, photographic image, simple animation and sound melody and effects. The transmitting speed is only one second for character and mosaic image, and five seconds for high presentation density where the standard presentation density is 204 (V) × 248 (H) dots (120 Chinese characters and 480 alphanumerical and Kana characters) and the maximum high presentation density is as four times of standard density (480 Chinese and 1,920 small size characters). CAPTAIN can present four different images for standard density simultaneously in high density display.

In 1986, the number of information providers is nearly 600 and that of terminals is 16,000 units in 200 cities. Among information provided, 7.5 per cent is educational in terms of the number of frame but most of them are only information for entrance examination, schools and seminars. There are very few educational software such as English composition and drill and practice for mathematics. The cost of terminals is about $700, and the running cost is only 20 cents for three minutes. When we can use home telephone, and also TV monitor for CAPTAIN, we can use it interactively. Videotex is potentially useful for distance education if educational software for distance education would be fully provided.

I. Video Response System (VRS)

VRS (Video Response System)[45] is also a medium for transmitting still and moving pictures with sound from the information center to users via broad band cable. There are three kinds of services: (i) still picture such as color photographic picture, character, graph and figures; (ii) motion picture and moving image; and (iii) sound, human voices (message) and music. When users ask to watch still picture with sound, the access time is only 0.1-0.5 seconds. But the access time to view moving picture is 11 seconds. When many users ask for it simultaneously, some cannot get the information asked for. Although VRS is now experimentally utilized, it would be useful for distance education in cases of audiovisual education and a sort of CAI. At the moment the number of educational software in the system is very few. Among them, we can study introduction to English, English abroad, mathematics, science, social studies, Japanese calligraphy, introduction to microcomputer, network planning, etc. VRS includes both the characteristics of CAPTAIN, the remote access video control system and more.

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[45] NTT, *VRS*, 1985.

J. Community Antenna TV (CATV)

CATV is a system connecting subscribers with cables and transmitting audiovisual information. Formerly CATV was the abbreviation of Community Antenna TV, but nowadays some of CATV are considered as powerful interactive communication media. Special CATV having interactive function more than five self-production channels and over 10,000 subscribers is called urban type CATV. There are now 14 recognized, e.g. International Cable Network, Tokyo Infornet, Central Cable TV, and so on.

Table 12 shows the number of CATV facilities. There are many small size CATV scattered all over Japan. A number of software producers for CATV are now about 20. Among them, JPS, Gakken, Kawai Jyuku, and so on are producing educational software. ACCS in Tsukuba is rebroadcasting TV programs from 12 TV channels, broadcasting self-made programs via Channel 9, and conducting cable text service, pay TV service, polling service, user response system and security system. Channel 29 broadcasts English conversation programs provided by other production and self-made science programs. CATV would be useful especially for regional distance education from study centers.

K. Optical Fiber Communication

Optical fiber has greater merits than coaxial cable for transmitting information. Now in Japan, the main truck was set up from Asahikawa, northern part of Japan to Kagoshima, southern part of Japan. Also some CATV are using optical fiber system instead of coaxial cable.

In Tokyo Institute of Technology,[46] two campuses 25 km apart were linked by optical fiber cable for reciprocal audiovisual and data communication. The optical fiber of 26.4 km was laid between two campuses along the private railway without repeater. Eight channels are simultaneously available, one pair of TV lecture rooms and 29 tutoring rooms, i.e. 18 in the main campus and 11 in another campus as shown in Figure 19.

Figure 20 shows the features of a lecture room and instructor's desk and the construction of a terminal in a tutoring room. The professor can teach by using chalk and blackboard, VTR, slide, OHP and

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[46] Simizu, Y., "TV Links Computers for Efficient Time Utilization," *Business Japan*, March 1983, pp. 76–77.
Simizu, Y., "Inter-Campus Tele-Conference System," *Business Japan*, March 1984, pp. 61–67.

Table 12: CATV IN JAPAN

Size (terminals)	Number of Station	Ratio
above 20,001	16	0.04
10,001 ~ 20,000	15	0.04
5,001 ~ 10,000	31	0.07
1,001 ~ 5,000	286	0.71
501 ~ 1,000	202	0.50
51 ~ 500	23,118	57.22
51 ~ 500	23,118	57.22
below 50	16,735	41.42
Total	40,403	100,00

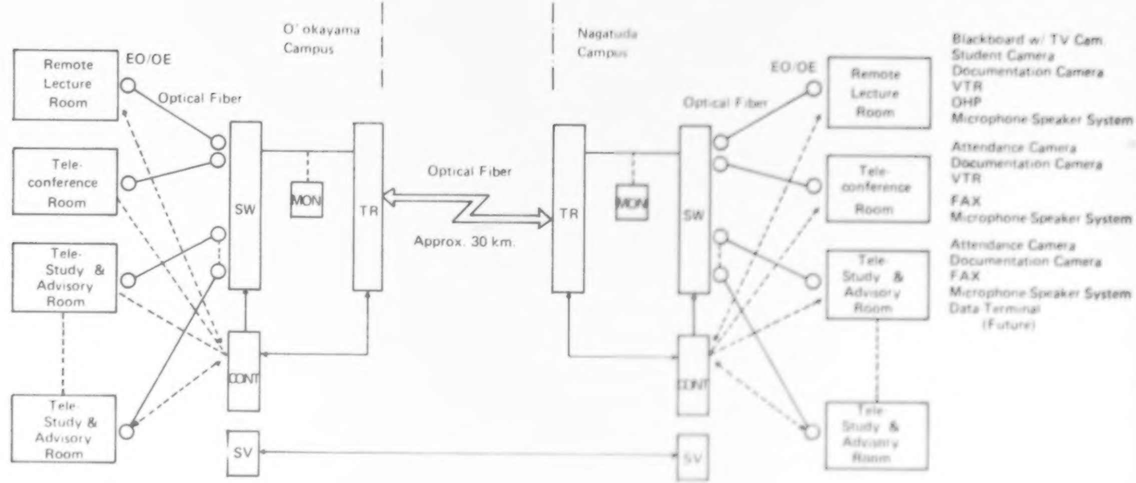
overhead camera. The scene in a lecture room is transmitted to two large video screens in another lecture room. The scene in another lecture room is reversely seen in two monitor TVs in front of the professor. Therefore, the professor and students in two lecture rooms can communicate with each other. In a tutoring room, a professor can discuss with and teach a graduate student at a distance. Both can see either each other's face or materials transmitted in a motor TV and also monitor images being sent in a small TV. The cost of hardware is approximately ¥1.1 billion ($7 million), including the cost for restoring the rooms but excluding the cost for building.

L. Communication Network System for Distance Education

There are two kinds of communication network systems available for distance education. One is CATV-based information network system and another is telecommunication-based information network system. Of the former, HiOVIS, Suwa Lake City Cable Vision, and Koyu Gaukuen are typical examples. Of the latter, Electronic Computer-Originated Mail, B.B.S., Osaka Association for Engineering Industry, tele-learning system, computer-based distance education system in Japan and Teikoku Women's University are typical examples.

HiOVIS (Highly Interactive Optical Visual Information System) was developed in 1978 and is being implemented by MITI (Japanese Ministry of International Trade and Industry), VISDA (Visual Information System Development Association) and private enterprises. One

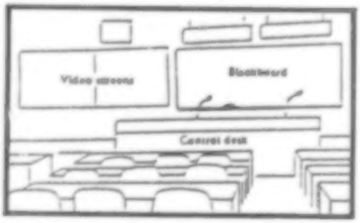
Figure 19: SYSTEM BLOCK DIAGRAM


O' okayama Campus
Nagatuda Campus
Remote Lecture Room
EO/OE
Optical Fiber
Tele-conference Room
Tele-Study & Advisory Room
Tele-Study & Advisory Room
SW
MON
TR
CONT
SV
Optical Fiber
Approx. 30 km.
TR
MON
SW
CONT
SV
EO/OE
Optical Fiber
Remote Lecture Room
Tele-conference Room
Tele-Study & Advisory Room
Tele-Study & Advisory Room
Blackboard w/ TV Cam.
Student Camera
Documentation Camera
VTR
OHP
Microphone Speaker System
Attendance Camera
Documentation Camera
VTR
FAX
Microphone Speaker System
Attendance Camera
Documentation Camera
FAX
Microphone Speaker System
Data Terminal
(Future)

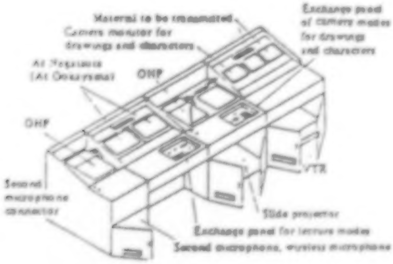
Abbreviation List

EO/OE : Electric-to-Optical/Optical to Electric Signal Convertor
CONT : Controller
MON : Audiovisual Monitoring Equipment
SW : Audiovisual Switching Equipment
SV : Supervisory Equipment
TR : Transmitter and Receiver

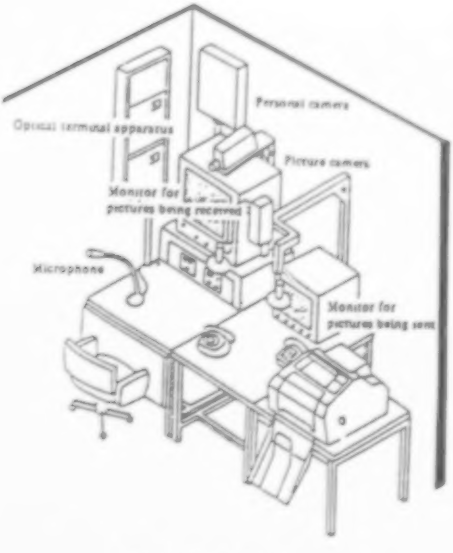
Figure 28: OPTICAL FIBER TEACHING ROOM


Video screens
Blackboard
Control desk

LECTURE ROOM


Material to be transmitted
Camera monitor for drawings and characters
Exchange panel of camera modes for drawings and characters
OHP
OHP
Second microphone connector
VTR
Slide projector
Exchange panel for lecture modes
Second microphone, wireless microphone

INSTRUCTOR'S DESK


Personal camera
Optical terminal apparatus
Picture camera
Monitor for pictures being received
Microphone
Monitor for pictures being sent

ADVISORY ROOM

hundred fifty six homes and the HiOVIS Center are connected by optical fiber. The total length of the fiber is approximately 350 km.

As each home has one camera, one display panel and one keyboard; they can communicate reciprocally. The HiOVIS Center can transmit information through 29 channels simultaneously: nine for TV retransmission, one for TV studio broadcasting, seven for video request service, seven for still picture service and five for other services.

Among this variety of services are social education courses supported by the National Institute of Multimedia Education in 1984. This series of courses was called the "Citizen's University Course". Three courses were transmitted to monitors: "Theories and History of Religion", "Education and Society" and "Computer and Society". The first two were taken from the series produced and broadcasted as part of the U.A. pilot TV programs. The last one was an original production. Fourteen monitors answered a questionnaire concerning the program "Education and Society". Sixty-four per cent reported that interest in the topics was high, but 57 per cent reported that these programs did not utilize the merits of two-way communication.

Suwa Lake City Cablevision is a large-scale optical fiber network CATV having 26,000 subscribers. In 1985, this system received the three series of ETV program from the University of the Air and rebroadcasted them to students' homes. Then some subscribers set FAX or microcomputer connected to the National Institute of Multimedia Education. They sometimes had communication to the Institute for their studies. Now, five series of ETV program are utilized for similar experiments.

Koyu Gaukuen Private Coaching School uses CATV, local UHF TV and FAX for teaching English and Math to third grade junior high school students at home. Students watch lecturers on CATV and UHF TV, then communicate with remote instructors with FAX and sometimes go to study centers.

Osaka Association of Engineering Industries conducted technical education for electronics to five companies by using tele-training system. The system can simultaneously transmit available information by the tele-conference unit and character, color and handwriting graphics by microcomputer network. Figure 21 shows the configuration of the system.

In the Earth Lab project in the Bank Street College of Education,[47] sixth grade primary school children in New York City and San Diego City exchange information and coordinated classroom work for studying plate tectonics via electronic mail system.

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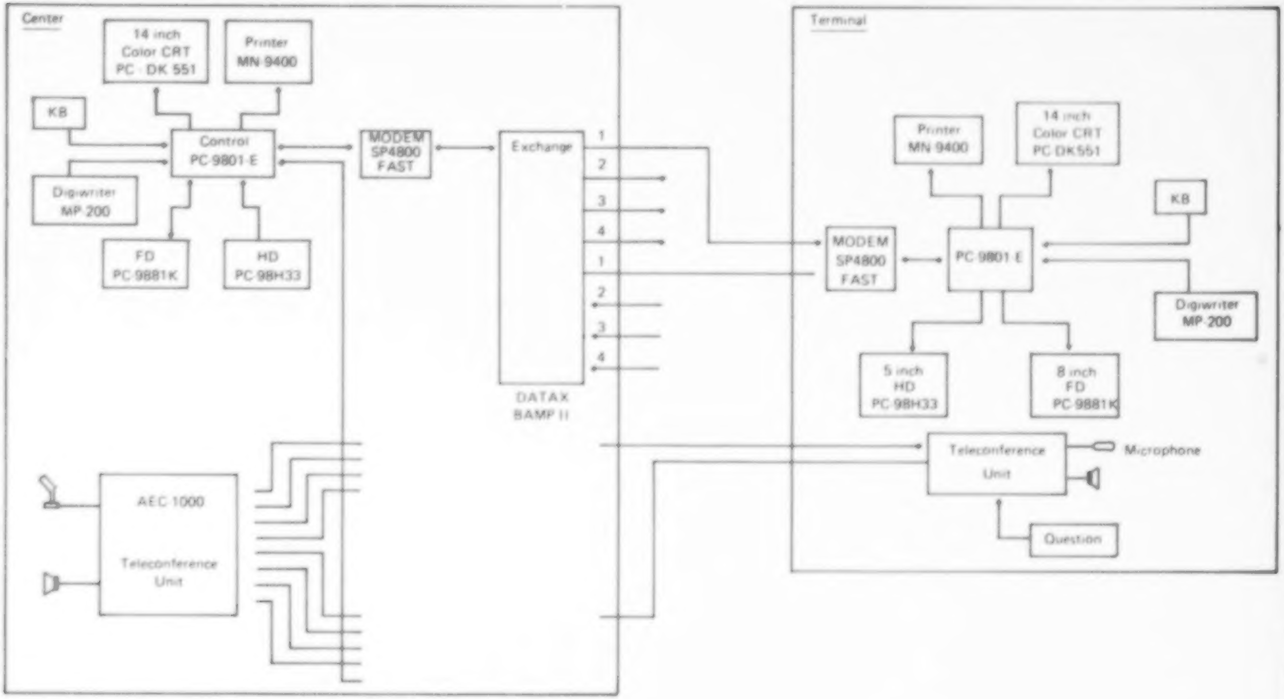
[47] Newman, D., *Local and Long Distance Computer Networking for Science Classrooms*, San Francisco, AERA, 1986.

Figure 21: CONFIGURATION OF TELETRAINING IN OSAKA ASSOCIATION OF ENGINEERING INDUSTRIES


Center
14 inch
Color CRT
PC - DK 551
Printer
MN-9400
KB
Control
PC-9801-E
Digiwriter
MP-200
FD
PC-9881K
HD
PC-98H33
MODEM
SP4800
FAST
Exchange
1
2
3
4
1
2
3
4
DATAX
BAMP II
AEC-1000
Teleconference
Unit
Terminal
Printer
MN-9400
14 inch
Color CRT
PC-DK551
KB
MODEM
SP4800
FAST
PC-9801-E
Digiwriter
MP-200
5 inch
HD
PC-98H33
8 inch
FD
PC-9881K
Teleconference
Unit
Microphone
Question

Similar activities were conducted in the international learning network project among university students in Israel, Japan and US. Also Japanese university students entered the AOU in NYIT for studying "College Compositions 1" course via electronic mail system. The running cost for a student was $75 for enrollment fee, $75 for tutoring fee per half a year, $14 for textbook, $25 for correspondence, $50 for postal service, and $27 a month for international telephone.

Electronic computer-originated mail is a new medium for transmitting letters. As senders bring a floppy disc or a magnetic tape to a post office then the information is transmitted to another office, transferred to printed letters and automatically enclosed in the envelope with the receiver's address. This system can treat 10,000 letters per hour. The cost is approximately 50 cents per letter. This system is effective for sending quickly and simultaneously the same information to different receivers at the same time and would be useful for distance education.

Japan Education System Co.[48] set up the LINES (Learning Information Network System). This is a kind of computerized distance teaching system. Educational software is transmitted from the host computer in the Center to microcomputers of students at remote places every day. Students study it and data are sent back from each terminal to the Center. The host computer analyzes these data every day. The number of students is now gradually increasing.

The INS (The Information Network System)[49] is an integrated media system composed of all sorts of communication media such as teleconferencing, CAPTAIN, Video Response System, telephone, nationwide telex network, original data exchange network system and FAX network system, and so on. Now the system is experimentally implemented in Mitaka area in Tokyo. Figure 22 shows how the system works.

USE OF BROADCAST IN ASIA AND THE PACIFIC

A. Accessibility and Availability of Radio, TV and Videotaped Programs

Diffusion rates of radio receivers (%) in Asian and Pacific countries are higher in Australia (131), Fiji (61), Hong Kong (51), Japan (128), Korea (43) and New Zealand (89) than in other countries, such as

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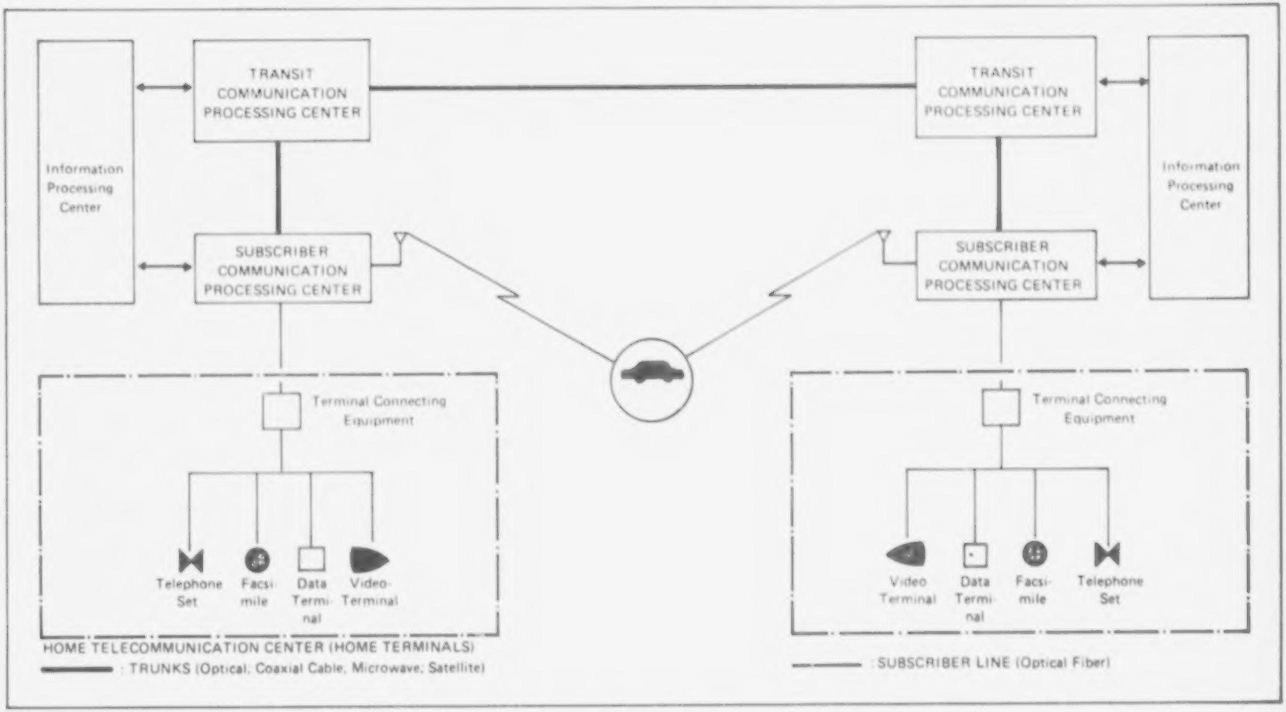
[48] Japan Educational System, *Learning Information Network System*, Tokyo, Nippon Kyoiku System, G&N, 1986.

[49] NTT, *Data Communication Service*, 1985.

Figure 22: INS CONFIGURATION


TRANSIT COMMUNICATION PROCESSING CENTER
TRANSIT COMMUNICATION PROCESSING CENTER
Information Processing Center
Information Processing Center
SUBSCRIBER COMMUNICATION PROCESSING CENTER
SUBSCRIBER COMMUNICATION PROCESSING CENTER
Terminal Connecting Equipment
Terminal Connecting Equipment
Telephone Set
Facsimile
Data Terminal
Video-Terminal
Video Terminal
Data Terminal
Facsimile
Telephone Set
HOME TELECOMMUNICATION CENTER (HOME TERMINALS)
: TRUNKS (Optical; Coaxial Cable, Microwave; Satellite)
: SUBSCRIBER LINE (Optical Fiber)

Bangladesh (1), Bhutan (1), Burma (2), Nepal (2) and Philippines (4) as shown in Table 13. Total broadcasting hours per year for educational radio programs (the number of 1,000 hours) are higher in Australia (14), India (46), Indonesia (51), Japan (29), Korea (69), Malaysia (11) and Philippines (790) than in other countries like Bangladesh, Bhutan, Burma, Fiji (0.6) and Nepal (0.5).

Therefore, educational radio would be widely available in those countries such as Australia, Japan, Korea and New Zealand.

The coverage of radio broadcasting as shown in Table 14 is very high in India and in the Philippines. In both countries, the increase in diffusion rates of radio receivers would be important for distance education because educational radio broadcasting hours and coverage of radio broadcasts are already high. However, in Indonesia and in Malaysia, the broadcast hours for educational radio are higher, but diffusion rates of radio receivers and coverage of radio broadcasting are still not enough. In Fiji and Hong Kong, increase of educational radio broadcasting hours would be important.

In terms of TV monitors, diffusion rates (%) are higher in Australia (36), Hong Kong (23), Japan (26), New Zealand (30) than in Malaysia (9), Philippines (3), and Thailand (4), and in other countries such as Bangladesh (0.2), Burma (0.1), India (0.3), Indonesia (2), Pakistan (1) and Sri Lanka (2). Bhutan, Fiji, Nepal and Papua New Guinea do not broadcast by TV yet.

Total broadcasting hours for educational TV programs (the number of 1,000 hours) are more in Australia (28), Japan (71) and Philippines (75) than in other countries and also a few in Hong Kong (1), India (2), Indonesia (5), Korea (2) and Malaysia (1) as shown in Table 13. But these are less in Bangladesh (0.2), Burma, Sri Lanka, Pakistan (0.3) and Thailand. Coverage of TV broadcasting is wider in Bangladesh, Japan, India, Indonesia and Pakistan.

Therefore, ETV is widely accessible in those countries such as Australia, Japan, Korea, Malaysia and Philippines.

But in India and Indonesia, as many educational TV programs are broadcasted and coverage of TV diffusion is already wider as shown in Table 14, it would be most important to increase TV monitors. In Bangladesh and Pakistan as coverage is wide, TV monitors should be widely distributed and production of educational TV programs should also be promoted. In Thailand, many families have already TV monitors, therefore, it is desirable to produce more ETV.

In primary schools, radio is usually utilized for supplementing classroom teaching in many countries such as India, Indonesia, Japan, Korea, Malaysia and Thailand. But in secondary schools, radio is

Table 13: PRESENT STATE OF RADIO AND TV IN ASIAN COUNTRIES

	Radio			T V		
1981	Number of Receivers /1,000 habitants 1982–84	Total Annual Broadcasting Hours	Broadcasting Hours for Educational Programs	Number of Receivers /1,000 habitants 1982–84	Total Annual Broadcasting Hours	Broadcasting Hours for Educational Programs
Bangladesh	8 (8)	* 4,995	624	0.9 (2)	* 2,007	230
Bhutan	8 (9)	3 Hr/day	?	/	/	/
Burma	22 (22)	15 Hr/day	University Correspondence Program	? (1)	2 Hr 30 min/day	Ed. TV 13%
Hong Kong	505 (507)	Total 63,329 Gov't 42,523 Comm 20,806	Total 1,063 Gov't 1,063 Comm –	225 (229)	Total 24,068 Gov't 1,489 Comm 22,579	Total 1,512 Gov't 1,018 Comm 494
India	59 (56)	* 460,450	* 45,820	1.8 (3)	* 14,350	* 2,456
Indonesia	120 (131)	266,708	50,697	21 (23)	25,578	5,167
Japan	688 (1,245)	Total 448,921 Public 20,231 Comm 428,690	Total 28,807 Public 5,810 Comm 22,997	252 (260)	Total 599,204 Public 12,991 Comm 586,213	Total 70,969 Public 6,188 Comm 64,781
Republic of Korea	413 (426)	*Total 372,321 Public 196,736 Comm 175,585	*Total 69,049 Public 45,939 Comm 23,110	175 (198)	*Total 24,854 Public 5,720 Comm 19,134	*Total 1,649 Public 972 Comm 677
Malaysia	103 (114)	* 79,161	* 10,714	85 (88)	* 9,569	* 1,319
Nepal	23 (23)	* 4,420	* 499	/	/	/
Pakistan	71 (75)	* 61,050	* 4,648	11 (14)	*Total 2,230 Public 2,074 Comm 156	*Total 32 Public 32 Comm –

* Data gained before 1981

Table 13: PRESENT STATE OF RADIO AND TV IN ASIAN COUNTRIES (cont'd.)

	Radio			T V		
1981	Number of Receivers /1,000 habitants 1982–84	Total Annual Broadcasting Hours	Broadcasting Hours for Educational Programs	Number of Receivers /1,000 habitants 1982–84	Total Annual Broadcasting Hours	Broadcasting Hours for Educational Programs
Philippines	44 (43)	Total 3,949,560 Gov't 1,282,360 Public 354,240 Comm 2,312,960	Total 789,912 Gov't 256,472 Public 70,848 Comm 462,592	22 (25) (39)	Total 376,246 Gov't 107,566 Public 14,040 Comm 254,640	Total 75,250 Gov't 21,514 Public 2,808 Comm 50,928
Sri Lanka	107 (112)	32,799	2,906	3 (16)	9 Hr/day	?
Thailand	125 (148)	63 Hr 40 min by 4 ch. /day	18 Hr 40 min/day	17 (41)	28 Hr 30 min by 4 ch. /day 58 Hr 30 min/weekend day	1 Hr 30 min/W 1 Hr/day STOU
Vietnam	(103)	24 Hr/day	?	225 (38)	3 Hr/day	?
Australia	1,112 (1,310)	*Total 1,659,069 Gov't 701,584 Public 65,579 Comm 891,906	*Total 13,671 Gov't 12,236 Public 787 Comm 648	380 (358)	Total 248,778 Gov't 87,735 Comm 161,043	Total 28,362 Gov't 24,953 Comm 3,409
Fiji	481 (606)	* 12,592	* 896	/	/	/
New Zealand	890 (890)	59 Hr 30 min/day	?	285 (303)	15 Hr/day	?
Papua New Guinea	65 (97)	46 Hr 30 min/day	?	/	/	/

* Data gained before 1981

Table 14: SITUATIONS OF MEDIA TECHNOLOGY IN ASIA AND OCEANIAN COUNTRIES

Name of Country	Bangladesh	Bhutan	Burma	Fiji	Hong Kong	India	Indonesia	Malaysia	Nepal	Pakistan
Size (km)	143.998 00	47,000 00	676,552 00	18,274 00	1,045 00	3 287 590 00	1 904 569 00	329,749 00	14,757 00	803,943 00
Population (million)	94 65	1 36	37 55	0 67	5 31	732 26	9 43	14 86	15 74	89 73
Average Income (US$ /year)	140 00	80 00	190 0	2 000 00	5,100 00	260 00	482 00	1,840 00	150 00	350 00
Expenditure for Education to (%) Public Expenditure	8 60		12 20		15 00	9 60	9 30	16 40	8 30	5 10
Ratio of Students among the Same Age Group (%) P S H					96 94 60 67 14 8		100 38 27 5 5 2 7			57 31 20 8 3 1
Literacy	74		34			64	33	42	81	74
Products 1982 Concerning (1000 Hardware unit)	Telephone		Radio		Microcumputer Electronics R 42056	Telephone R 1563	Telephone R 1523	Telephone		
Telephone (%) Defusion Rate	0 1	0.01	0 1	7 0	35	0 5	0 44	6 3	0 1	0 5
Dial	89 5	97 0	67 7	96 6	100	87 9	88	100	90 9	91 3
Postal Service 1978	261M		78 M			7707M	207M	376M		551M
Broadcast TV N (%) R N (%) Coverage %	0 2M (0 2) 0 7M 85% (0 8) NBA	7 00 (0 6) NYAB	0 24M (Street) 0 7M (2) BBS	0 4 (62) FBC	1 3 (25) 2 55 (50) RTHK HK-TVB ATV RHK	1 67 70% (0 2) 30 95% (90) DDI AIR 21 main languages 246 dialects	3 1 100% (2) 6 2 100% (4) TVRI RRI	1 3 (0 9) 1 59 (11) RTM STMB	0 3 (2) RNE	1 2 81% (1 4) 5 5 95 100% (6 5) PTV PBC
Communication	Intelsat		Intelsat	Intelsat DEACESAT	Intelsat Videotex	Intelsat Insat	Palapa A, B Intelsat	Intelsat	Intelsat	Intelsat
Training	Training center in Dhaka (UNDP)		PTC, ITU Training Center	TTC Telecom Training Center (ITU)	Kwun Long Training Center	13 Regional Training Center (P & T) 15 circle 10 districts	PERUMTEL Training Center	ITU Training Center, Telecom Training Center, National Broad casting Trng. Center USM	Telecom Training Center	Tellcom Staff College Region Telecom Training Center

Table 14: SITUATIONS OF MEDIA TECHNOLOGY IN ASIA AND OCEANIAN COUNTRIES

Name of Country	Papua New Guinea	Philippines	Republic of Korea	Soc. Rep.of Viet Nam
Size (km)	461,961	300,000	98.484	329.566
Population (million)	3.19	52.06	39.95	57.99
Average Income (US$ / year)	780	631	1.291	160
Expenditure for Education to (%) Public Expenditure		10.3	21.5	
Ratio of Students among the Same Age Group (%) P S H			100 94 85 33 14	
Literacy		17	12	16
Products 1982 Concerning (1000 Hardware unit)		Telephone	Electronics TV 5949 R 5883	
Telephone (%) Defusion Rate	1.6	1.2	13.8	0.18
Dial	99.9	100	71.3	?
Postal Service 1978			780M	
Broadcast TV N % R N % Coverage %	0.2 (6.6) PNGNBC	1 (2) 2.1 (4) MBS	6.6 (17) 15.0 99% (39) KBS MBC CBS KBS TV 1 48% (ETV) 2 55% KEDI 3 100%	2 (3.6) 3 (5.4) VNRC
Communication	Intelsat PEACESAT	Intelsat Palapa	Intelsat	Intersputnik
Training	Training Center	PLDT BUTEL Telecom Training Institute	ITU Training Center Telecom Training Center	

Name of Country	Sri Lanka	Thailand	Australia	Japan	New Zealand
Size (km)	65.610	514,000	7,686,848	372,319	268,676
Population (million)	15.42	49.46	15.37	120.00	3.20
Average Income (US$ / year)	300	613	8,399	7,112	6,242
Expenditure for Education to (%) Public Expenditure	8.7	20.3	14.5	19.4	14.5
Ratio of Students among the Same Age Group (%) P S H		96 29 22		100 91 94 40 23	
Literacy	14	12		0.3	
Products 1982 Concerning (1000 Hardware unit)		Telephone R 880	Electronics TV 377	Electronics TV 12796 R 14318	Telephone
Telephone (%) Defusion Rate	0.7	1.19	54	51	58.8
Dial	77.4	100	99.2	99.8	98.7
Postal Service 1978	590M	212M	2282M	15,391M	588M
Broadcast TV N % R N % Coverage %	0.25 (1.7) 1.45 (10) SLBC ITN SLRC	2 (4) 5.9 (12) NBT Mass Communication Organization of Thailand Bangkok Broadcasting & TV Co., etc.	5.52 (37) 15 (100) ABC SBS HACBS	30.68 (26) 136 (115) NHK	0.92 (29) 2.75 (88) BCNZ
Communication	Intelsat	Intelsat Palapa	Intelsat Contravision Vicetel Aussat	Intelsat BS CS FAX Videotex VENUS-P	Intelsat Videotex Teletext
Training	Telecom Training Center Postal Training Institute	TOT Training Center		NTT	many

sometimes utilized for supporting correspondence high school education, e.g. in the Open Junior High School of Indonesia, the COES (College of External Studies) in Papua New Guinea, and the ACHS (Air and Correspondence High School) in Korea.

In terms of TV, broadcasting programs are utilized mainly for supplementing subject teaching in primary and secondary classrooms. For example, there are many cases in Hong Kong, Indonesia, Japan, Korea, Malaysia, Philippines and Sri Lanka. Radio and TV are used in Open Universities such as the BIDE (The Bangladesh Institute of Distance Education), the Indonesia OU, AIOU (Allama Iqbal OU) in Pakistan, the KACU (Korean Air and Correspondence University), the University of the Air and the Sri Lanka OU and STOU (Sukhothai Thammathirat OU).

Radio receivers are produced in Hong Kong, Indonesia, Japan, Korea and Malaysia as shown in Table 14. Figures in 1982 were 14.3 (13 in 1985) million in Japan, 37.8 (42.0 in 1985) million in Hong Kong, and 1.7 (5.8 in 1985) million in Korea. Radio cassette tape recorders are also produced in Hong Kong, Japan, Korea, and so on as shown in Tables 15, 16 and 17.

In terms of TV monitors, Japan produced 16.9 million (color) in 1985, Korea produced 4.3 million (monochrome) and 4.5 million (color) and Hong Kong produced 418,000 color TV and 83,000 monochrome TV sets.

The figures are predicted to increase in Korea (4.5 to 7 and 10 to 16) and Hong Kong (0.4 to 0.6 and 6.6 to 7) for color TV and radio cassette from 1985 to 1986 in million unit. Radio receivers are also produced in Thailand (0.9 million), India (1.6 million), Indonesia (1.5 million) and Burma as shown in Table 14.

As radio is produced in several Asian countries, it may become a potentially useful medium for distance education. But we should consider the phenomena in Japan that the use of educational radio programs is getting smaller as the ETV programs and VTR is getting popular in schools as shown in Figure 15. The effects would be larger in ETV than in radio. Therefore, radio will have a role for in-between media passing to ETV period.

However, many countries do not produce electronic products such as videodisc, microcomputer and new technologies, excluding Japan, Korea and Hong Kong. Application of high technology in distance education will take more time.

Table 15: PRODUCTION OF COMMUNICATION MEDIA IN JAPAN

			1985 (1,000)	Diffusion Rate in Family
Video	TV	BW TV	847	
		Color TV	16,880	99.1%
	VTR		28,283	27.8
Audio	Stereo		2,705	
	Cassette			73.6
	Radio		12,995	
	Sound MPX			41.5
Telephone	Dial		8,326	
	Push Button		6,516	
Word Processor Microcomputer			1,122	
CRT			30,059	

Table 16: PRODUCTION OF COMMUNICATION MEDIA IN HONG KONG (1,000/year)

			1985
Video	TV	BW TV	83
		Color TV	418
Audio	Stereo		41
	Cassette		6,637
	Radio		37,859
Telephone	Codeless		989
	Telephone		HK$ 1,448 (M)

Table 17: PRODUCTION OF COMMUNICATION MEDIA IN KOREA (1,000/year)

			1985
Video	TV	BW TV	4,335
		Color TV	4,524
	VTR		1,391
Audio	Stereo		4 330
	Cassette		10,345
	Radio		1,741
Telephone	Dial		4,808
	Multi-Function		419
Floppydisc			40
Color Monitor			140
Monochrome Monitor			2,400
Microcomputer			1,216

B. Audiovisual Equipment and Devices

In Asia, Japan, Korea and Hong Kong produce a variety of audio-visual equipment and devices. For example, in 1985, Japan produced 28 million VTRs, 2.7 million stereo players, 13 million radio receivers and 30 million CRTs; Korea produced 1.4 million VTRs, 4.3 million stereo players, 1.7 million radio receivers, and 2.4 million monochrome monitors; and Hong Kong produced 41,000 stereo players, 37 million radios as shown in Tables 15, 16 and 17. Other Asian countries import products from these three Asian countries and European or North American countries.

In order to implement distance education by broadcasting, a huge amount of investment for facilities is needed. For example, there are many broadcasting stations in Japan as shown in Table 18. The total number of television stations in 1985 was 12,965 including commercial stations. Among them, 3,415 are NHK educational stations. Also NHK has a lot of facilities as shown in Table 19: 101 radio and 72 TV studios. Four hundred forty-six professional VTRs are installed and 226 portable VTRs are kept. NHK produces radio and TV programs by using these facilities and broadcast them nationwide. But it is rather costly. Therefore, developing countries would have some difficulty in establishing their own broadcasting station system without special financial aid.

Moreover, schools should have radio and TV receivers and audio and videocassette recorders for better and effective use of educational broadcast.

Many countries and organizations support Asian countries in this point. For example, the Japanese government supplied 1,100 audio control console sets, consisting of radio receivers, amplifiers, cassette recorders, public address system and speaker facilities for classrooms and also ten mobile audiovisual vans to Bangladesh. Then the National Institute of Educational Media and Technology was organized and an integrated multimedia distance teaching system was introduced. The system included printed materials, radio, TV, group study, audiocassette as media for primary and secondary teacher training. The Bangladesh Institute of Distance Education also started to run courses including radio and TV in 1985.

In India, radio has been broadcasting for schools in order to supplement the regular curricula since 1950. In 1962 TV began in New Delhi and has been supporting classroom teaching since 1962. About 25 universities have correspondence courses but only the Institute of Correspondence in Patiala and Chandigarh uses radio. Also Andhra Pradesh Open University set up in 1982 plans to utilize printed materials as well as audiocassette and video lessons in 28 study centers.

Table 18: TRANSMITTING STATIONS OF NHK AND COMMERCIAL COMPANIES

(As of end of March 1985)

		NHK	Commercial Companies		Total
Television		6,906	6,059	(102 companies)	12,965
	General	3,491			
	Educational	3,415			
Radio		824	270	(63 companies)	1,094
Medium wave		324	207	(47 companies)	531
	Radio 1	183			
	Radio 2	141			
Short wave		–	2	(1 company)	2
FM		500	61	(10 companies)	561
Radio (Overseas)					
Short wave		1 (In 21 languages and for 40 hours a day)	–		1

Table 4.7 : TECHNICAL FACILITIES OF NHK

(As of end of March 1985)

	Studio		TV Camera	OB Van	VTR	
	Radio	TV			Stationary	Portable
Tokyo	23	22	204	18	169	57
Regional	78	50	438	111	277	169
Total	101	72	642	129	446	226

In Indonesia, the Open Junior High School uses programmed printed materials, audiocassette, slides and radio and the Indonesia OU uses educational TV for 25 minutes every two weeks. Concerning school broadcast, 30 minutes weekly is provided to ETV for primary and secondary schools. Twenty-three per cent of broadcast programs is educational TV but VTRs are not introduced in schools yet. The figure is only less than 1 per cent. Indonesia imports 61 per cent of TV from Japan and 23.6 per cent from ten EC countries.

In Malaysia, broadcast education is well implemented, many radio (77 series) and TV (30 series) programs are produced and broadcasted. Approximately 7,700 TV sets and 4,000 generators were distributed to Malaysian schools. Malaysia imports TV mainly from Japan (57 per cent) and France (26 per cent). The USM (University of Science Malaysia) has off-campus programs, uses audiocassette, slides in regional learning centers, and broadcasts radio (30 minutes weekly).

In Nepal, 25,000 radios are used on loan by untrained primary teachers in RETTP (Radio Education Teacher Training Programme).

In Pakistan, AIOU has 65,000 enrolled students, ten regional centers and 150 local study centers, and produces 300 radio and 75 TV programs per semester. Study centers are equipped with radio, TV sets and audiocassette recorders.

In Papua New Guinea, the COES has 9,000 students, 18 provincial centers, and ten registered study centers, and uses radio and audiocassettes.

In the Philippines, 60 per cent of primary and secondary schools have VTRs. TV sets are imported from Japan (50 per cent) and the UK (29 per cent). Audiovisual Management Group in the MECS (Ministry of Education, Culture and Sports) produces educational school TV. Thirty-minute programs are broadcasted twice a week for primary and secondary schools. Also the UM Air (University of Mindanao on the Air) uses radio.

In Korea, the KEDI (Korean Educational Development Institute) produces 3,000 programs yearly for classroom use and broadcast them three hours a day. The ACHS (Air and Correspondence High School) has 35,000 students and 48 regional schools and use self-learning and radio as media. The KACU has also 120,000 students and uses radio and TV.

In Sri Lanka, school radio broadcast for 15–20 minutes every day on weekdays and 20-minute TV programs are telecast. Sri Lanka OU has 18,000 students and uses radio and TV in the weekend and vacation contact sessions. Concerning teacher training, audiocassette and videocassette are utilized in 300 teacher centers.

In Thailand, the CEIT (Center for Educational Innovation and Technology, Department of Non-Formal Education) has five studios and produces and broadcasts school radio programs 25-½ hours weekly via the NERN (National Educational Radio Network). Fifty per cent of schools has TVs. Radio and TV are imported from Japan (53 per cent) and USA (30 per cent). STOU also uses radio and TV one hour daily. In teacher training, audiocassette and radio are used. In radio correspondence program, radio programs are broadcasted for 20 hours a week.

Abovementioned is a rough sketch of the use of media in Asian countries. Almost all countries are more or less producing educational radio and TV programs either for broadcast education to the regular school teaching or for direct distance education. However, there are several problems:

(i) shortage of equipment and devices both in educational institutions and study places;
(ii) shortage of air time;
(iii) broadcast is costly as in many countries, educational institutions should pay broadcasting fee to the broadcasters; and
(iv) shortage of software.

Some countries such as Hong Kong, India, Japan, Korea and Malaysia have a variety of broadcast programs, but other countries produce less programs.

Therefore, students would have some difficulty to access this kind of media. However, almost all open universities are now using radio and audiocassettes and many OUs are using even TV programs. The situation is getting better. The speed will be faster in countries having higher income average. First group was Australia, Hong Kong, Japan, Korea and New Zealand. While Fiji, Indonesia, Malaysia and Thailand are implementing distance education and while Bangladesh, India, Pakistan and Sri Lanka have also had excellent experiences, Papua New Guinea and Philippines would have a greater deal of potential. Other countries would follow well.

In the process, international cooperation is needed. Distribution of electric supply, supply of audiovisual equipment and devices, establishment of broadcasting facilities, production techniques for educational software, adaptations and transfer of good software and knowhow of broadcast education are important.

There are many kinds of international cooperation. For example, Japanese experts seconded Asian development projects for broadcasting mostly through working with JICA (The Japan International Cooperation Agency) as shown in Table 20. Among them, projects in Bangladesh, Burma, Indonesia, Nepal, Sri Lanka and Thailand are found.

Figure 23 shows the number of the NHK staff for long-term and short-term stays for international cooperation projects. In 1984, 107 stayed to assist to develop, plan, equip the broadcasting stations and facilities. Recently cooperative work is undertaken to provide educational TV programs from NHK to five Asian countries such as Indonesia, Malaysia, Philippines, Singapore and Thailand. This kind of international cooperation is very effective to increase availability of educational facilities and educational resources. The aid from ADB would contribute to promote these activities.

In terms of cost-effectiveness, Amagi estimated that the cost per student per year in NHK Gaukuen Correspondence High School was $308 and the cost of ordinary high school student was $540 in 1971, but that of graduates was $2,143. In 1985, the cost of a correspondence high school student per year was ¥137,754 ($900) and that of an ordinary high school student was ¥470,929 ($3,000) according to the statistics of the Ministry of Education, Science and Culture, but the cost of a NHK Gaukuen Correspondence High School was ¥160,000 ($1,000) excluding the cost for radio and TV program broadcasted to high school students via NHK. However, the programs are also utilized by ordinary high school students and other listeners and viewers nationwide.

Concerning the cost for educational radio and broadcast TV program, the revenue expenditure of NHK in 1985 was ¥328,488,761,000 and NHK broadcasts 20,231 hours for radio and 12,991 hours for TV, in which 5,810 and 6,188 hours were educational. The ratio of radio to TV production cost was 356 to 1,937 in 1972 according to NHK (Schram).

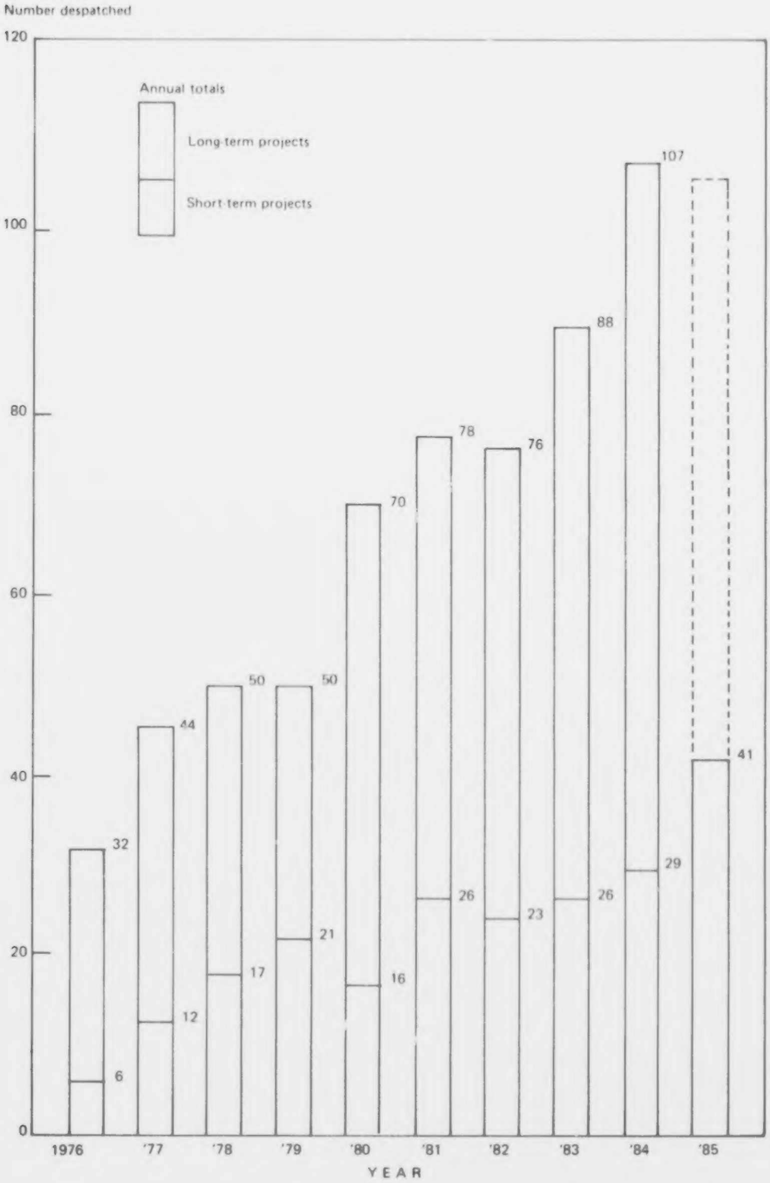
Therefore, ¥328 billion might be divided into ¥51 billion for radio and ¥277 billion for TV, and they are respectively estimated at ¥14.6 billion for educational radio and ¥132 billion for educational TV, if the cost for production is the same between educational and general broadcast programs. The cost per hour is ¥2.5 million ($16,000) for educational radio and ¥21.3 million ($137,000) for ETV, excluding the cost for purchase of existing facilities and equipment.

If we estimate the production cost of ETV as half of the GTV, the figure of ETV would be approximately $100,000 per hour. When one million people watch the program, the cost per person would be only 10 cents. In case of 100,000 people, it costs $1. The quality of ETV is constant, each one can receive the value of $100,000 via broadcast. In a sense, everybody can get $100,000 program by only 10 cents or $1 or so. Kim reported that the public expenditure of KACU was only ¥11,578

Table 20: DEVELOPMENTAL RESEARCH DEVOTED TO BROADCASTING: RESEARCH PROJECTS IN PLANNING AND EQUIPPING OF FACILITIES, COOPERATION IN BROADCAST PROJECTS

1973	Research for Zambia Information Center construction project
1976	Afghanistan Television equipping project
1977	Bangladesh Television construction project
1977-78	Nepal Radio Broadcast Network construction project
1978	Sri Lanka Television Broadcast Network construction project
1978-80	Radio Bangladesh Broadcast Hall construction project
1980	Research for West Malaysian FM Broadcast Network
1980-85	Cooperation for Panamanian Educational Television Center (Canal Once), Panama
1981	MMTC Indonesia construction project
1981	Paraguay Educational Television master plan project
1981-82	Project for expansion of broadcasting facilities for Burmese Television
1981-82	Thai Television University Programs Center construction project
1982	Peruvian Broadcast Network development project
1983	Research for broadcast project for Dominican Educational Television
1983	Research for general development project for Indonesian Broadcast Stations and Network
1983-84	Research for broadcast facilities project for Panamanian Short-Wave Station
1985	Research for Egyptian New Television Center construction project

Figure 21: INCREASE IN NHK STAFF DESPATCHED OVERSEAS IN INTERNATIONAL COOPERATION PROJECTS



per student in 1984 compared with ¥308,400 per ordinary college student. The ratio was 1 to 16. Muta (1985)[50] estimated that the cost of the University of the Air was only from ¥238,419 ($1,500) to ¥304,962 ($2,000) yearly per student compared with ¥2,125,652 ($13,700) to ¥2,163,174 ($14,000) for a national university student and from ¥907,672 ($5,800) to ¥907,800 ($5,900) for a private evening course student.

These figures suggest that distance education by broadcasting would be cost-effective. If regional or local study centers set up audio and video facilities, many people could access them. A good quality of educational software should be produced in the national centers. Sometimes commercial organizations can do this.

MAJOR PROBLEMS OF DISTANCE EDUCATION IN ASIA AND THE PACIFIC

A. Staff Development

Staff and personnel training should be undertaken in all fields of distance education in order to get effective results. At first, novices are not easy to operate or utilize hardware unless trained. Professional technicians must study how to operate, repair and maintain hardware and users must study how to select, combine and use hardware. Producers also must study about technologies on script writing, course design, sound technique, visual image technique, lighting, camera work and editing. Tutors on film, radio and TV should study how best to present educational materials and how best to use hardware in order to get higher level of educational effects.

Tutors in study centers also should study how to operate terminal equipment and devices such as tape recorder, videotape recorder, radio, television, tele-conference system, microcomputers, etc. and know how to select effective software, how to use it, how to evaluate it and how best to present it to local students. Learners must have study skills for operating terminal devices in order to succeed in independent study.

Professionals for telecommunication have to design, establish, maintain, repair and implement delivery systems such as telephone network and broadcast network. Administrators for distance education should study planning, budgeting, time allocation of broadcasting, scheduling for broadcast and staff training.

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[50] Muta, H., "The Economics of the University of the Air of Japan." *Higher Education*, 1985, pp. 14, 269–296.

All this kind of staff and personnel training is important and necessary for implementing effective distance education.

Every country is now conducting staff and personnel training. For example, staff training for broadcasting technology and telecommunication technology is conducted in most Asian and Pacific countries as shown in Table 14. In Malaysia, one year in-service training course at the Specialist Teacher Training College, one year in-service course for a diploma in educational technology at the University of Science Malaysia and Educational Resource Centers in four states are conducting personnel training for distance education. In the Philippines, training at national level is undertaken. In Sri Lanka, personnel for distance education are being trained and 60-hour training workshops are also organized.

There are a lot of international cooperative activities for personnel training.

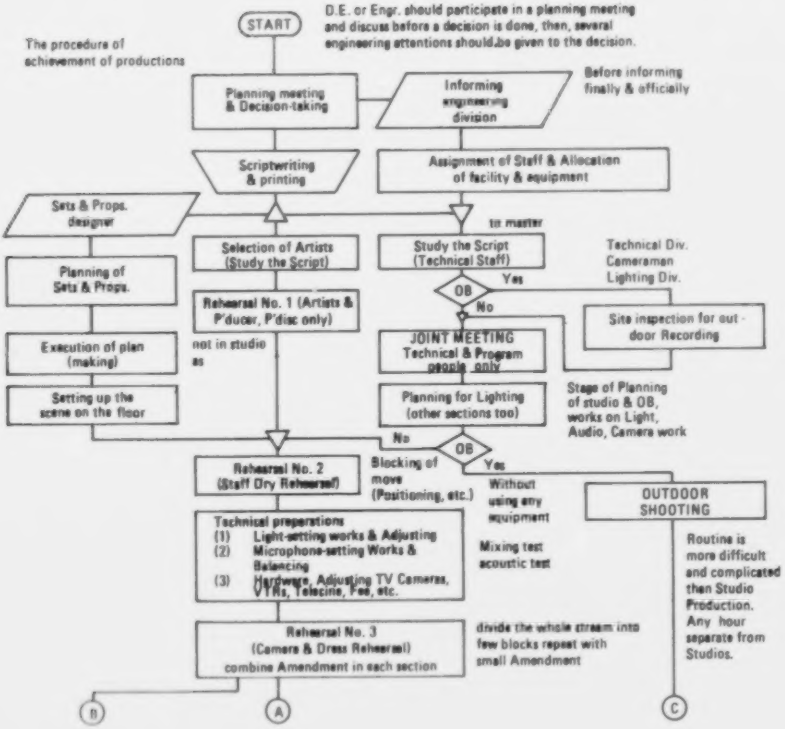
In 1984, for example, Japan accepted 423 persons in terms of broadcasting and communication. From Asian countries, 12 came for postal service training, 98 came for telecommunication training and 69 came for radio and TV training.

NHK also trained 70–80 students yearly for courses in such subjects as ETV programs and television broadcasting technology. Since 1961, about 1,400 specialists from more than 80 countries have visited Japan to study.

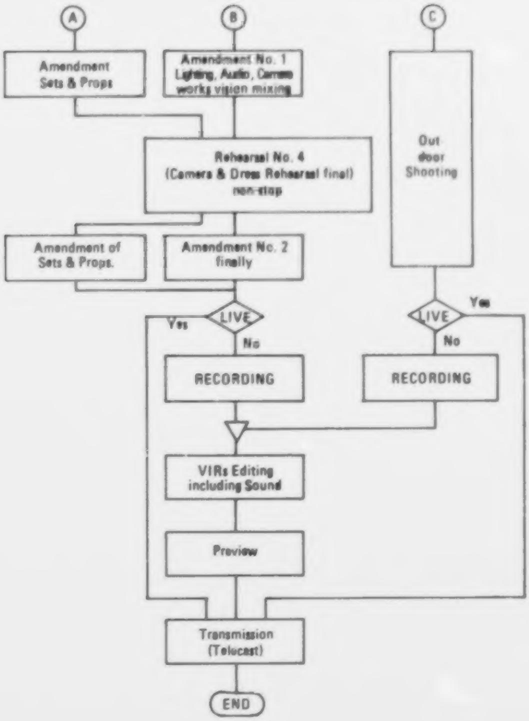
Specialists also visited Asian countries, seconded local personnel and taught trainees, e.g. at Telecom Training Center in Fiji, KMIT in Thailand and AIBD in Malaysia. There are five for postal services, three for telecommunications and 27 for radio and TV. Some specialists participated in projects in Asian countries, e.g. Indonesia RTV Broadcast Training Center, Philippines Telecommunication Training Center and Pakistan Central Telecommunication Research Institute. Also the expenses for promoting RTV in telecommunication field, such as the TV broadcasts extension project in Sri Lanka (¥1,430 million), regional telecommunication network (¥154 million), and Telecommunication Training Center in Sri Lanka (¥570 million) were donated in 1984. European countries, Australia and north America also send specialists to Asian countries for training personnel in distance education.

Figure 24 shows the procedure for television broadcasting program production which was taught in Sri Lanka by a Japanese expert. The training for professional technicians is important for producing and sending educational materials effectively to teachers and learners at a distance, but the training of teachers in study centers or schools is much more important. Even if high quality of software is produced and delivered to users, teachers and learners do not always study from such

Figure 24: PROCEDURE FOR


START
D.E. or Engr. should participate in a planning meeting and discuss before a decision is done, then, several engineering attentions should be given to the decision.
The procedure of achievement of productions
Planning meeting & Decision-taking
Informing engineering division
Before informing finally & officially
Scriptwriting & printing
Assignment of Staff & Allocation of facility & equipment
Sets & Props. designer
to master
Selection of Artists (Study the Script)
Study the Script (Technical Staff)
Technical Div. Cameraman Lighting Div.
Planning of Sets & Props.
OB
Yes
No
Rehearsal No. 1 (Artists & P'ducer, P'disc only)
Site inspection for out-door Recording
Execution of plan (making)
not in studio as
JOINT MEETING Technical & Program people only
Setting up the scene on the floor
Planning for Lighting (other sections too)
Stage of Planning of studio & OB, works on Light, Audio, Camera work
No
OB
Yes
Rehearsal No. 2 (Staff Dry Rehearsal)
Blocking of move (Positioning, etc.)
Without using any equipment
OUTDOOR SHOOTING
Technical preparations
(1) Light-setting works & Adjusting
(2) Microphone-setting Works & Balancing
(3) Hardware, Adjusting TV Cameras, VTRs, Telecine, Fee, etc.
Mixing test acoustic test
Routine is more difficult and complicated then Studio Production. Any hour separate from Studios.
Rehearsal No. 3 (Camera & Dress Rehearsal) combine Amendment in each section
divide the whole stream into few blocks repeat with small Amendment
B
A
C

PROGRAM PRODUCTION


A
B
C
Amendment Sets & Props
Amendment No. 1 Lighting, Audio, Camera works vision mixing
Rehearsal No. 4 (Camera & Dress Rehearsal final) non-stop
Out door Shooting
Amendment of Sets & Props.
Amendment No. 2 finally
LIVE
Yes
No
LIVE
Yes
No
RECORDING
RECORDING
VIRs Editing including Sound
Preview
Transmission (Telecast)
END

software. They may not know how to operate terminals or how to use it effectively.

Teacher and learner training in study centers should be undertaken in terms of distance teaching and distance study skills. In Japan, educational television is well utilized in many classrooms. Teachers usually have national and regional conferences for broadcast education and local study meetings are held monthly. Then classroom teaching using television programs is observed by participants, strengths and weaknesses are discussed, and main points to be improved are recommended by participants and supervisors. This sort of study meetings of teachers are undertaken everywhere nationwide. Producers from NHK usually attend these meetings and receive feedback on programs directly from teachers.

Based on these pieces of information and requests from users, educational television programs are modified. Of course teachers can also improve their own classroom teaching using television. Teacher training in actual classroom teaching situations is most effective and useful for promoting distance education in schools.

In promoting personnel development, teacher transfer strategy would be effective.

At the first stage, representatives from each region or state study at the national centers or the local institutes.

Then at the second stage, each representative would teach what she/he studied at the national center to their colleagues and representatives from local centers at the regional centers.

At the third stage, at local centers, a representative from the local center would teach what he/she studied at the regional center to their colleagues and instructors or teachers from each educational institution.

At the fourth stage, at schools or the smallest distance education units, instructors teach what he/she studied at the local center to personnel. They could serve to keep distance education for instruction, for management and for maintenance.

This style is often seen in in-service teacher training in Japan. The important thing is that every participant should consider to diffuse his own knowledge and knowhow to all colleagues without keeping it to himself.

B. Delivery System

Besides radio and TV, postal services and telephone are usually utilized for distance education. In Japan, letters are usually conveyed to everywhere for one or two days. If a professor needs five days for evaluation or comment, average turnaround time might be one week to ten days. In the cross-cultural cooperative work among five different distance institutions, average turnaround time was eight days for AIOU, 14 days for Darling Downs Institute of Advance Education, 13 days for OLI (Open Learning Institute), 25 days for the Tasmanian State Institute of Technology and 24 days for the USP.[51]

In DDIAE, shorter average turnaround time group completed the course better than the longer one and also shorter average feedback interval group completed more than longer the one. Also, in low additional contact group, more students did not complete the course than those in the high or additional contact group.

As quick turnaround time and shorter feedback intervals seem to be effective for distance education, the conditions of postal services as reliable, stable and low-cost media are very important in every country. The best strategy could treat distance education materials as express delivery by special low cost. In this case the financial aid concerning the cost difference should be given to postal services.

Anyway the postal service is very well-organized and implemented in almost all Asian and Pacific countries. Except in remote islands and mountain areas, it takes only one to three days for correspondence to be forwarded from the educational resources to learners and the cost may be inexpensive. Printed materials, slides, transparencies, audiotape, videotape and floppy disc can be sent by these media. As the same sort of software is sent to learners simultaneously, the automatic addressing, labeling and packaging machine would be helpful for making this service faster.

Telephone is also one of the quick response communication media, but the diffusion rate is still very low in many countries as shown in Table 14. Diffusion rates in Bangladesh, Bhutan, Burma, India, Indonesia, Nepal, Pakistan, Sri Lanka and Socialist Republic of Viet Nam are less than 1 per cent. Those in Fiji, Malaysia, Papua New Guinea, Philippines and Thailand are between 1 and 7 per cent. Those in Hong Kong and Korea are higher than the Asian and Pacific countries. Some countries such as Bangladesh, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines and Thailand are producing telephones and also import them mainly from Japan.

The Philippines imported telephones from Japan (49.2 per cent); Korea and Malaysia imported them from Japan (76 per cent); and Hong Kong and Indonesia imported from Japan (61 per cent) and EC (24 per cent); and Thailand imported from Japan (55 per cent). The Philippines particularly extended the National Telephone, which was supported with $483 million by the World Bank.

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[51] Barker, L. J., Taylor, J. C., While, V. J., Gillard, G., Kaufmann, D., Khan A. N. and Mezger, R., *Student Persistence in Distance Education: A Cross-Cultural Multi-Institutional Perspective*, 13th World Conference of ICDE, Melbourne, 1985.

If telephone networks are well organized in Asian countries, many possibilities for distance education would be available. Feedback systems in distance education as well as tele-training systems, including SSTV, auditory transmission, electric board, FAX and computer communication would be effective for direct distance education.

Some sort of policy for distributing and using telephone would be needed for distance education. The rank order of setting telephones should be considered as predominant for distance education. The cost for communication should be reduced at least for distance students.

As far as broadcast is concerned, establishment of broadcasting station with facilities and equipment coverage of broadcasting network, and installation of receiving devices in users are at least necessary for implementing distance education, but the cost is very expensive. Therefore, the financial aid or grants would be needed from developing countries or international agencies like the ADB or the World Bank.

Regarding the telecommunication network, the development of infrastructure would be more important as fundamental background. However, in urban areas equipped with advanced communication technologies, establishment and implementation of model experiments are desirable for the future development of distance education.

C. Regional and Local Resource Centers

Almost all distance institutions have study centers or regional learning centers, especially at higher education level. For example, the BIDE has ten study centers in teacher training colleges. Andhra Pradesh OU in India has 28 centers in 28 existing colleges, AIOU has ten regional and 150 local study centers, STOU has a study center in each province, Indonesia OU has 63 centers, the KACU has ten provincial and 15 country study centers, and the University of the Air has six study centers.

Every study center functions as a place for tutoring, counselling and as a resource center. Almost all study centers set audiocassette equipment and some center such as Andhra Pradesh OU, the KACU, STOU and the University of the Air have video equipment. In the BIDE, 100 video are brought by seven mobile audiovisual vans. Some of them are broadcasted. In Sri Lanka OU, radio and TV are listened to and watched at the weekend and vacation contact session in the study centers. In the KACU, radio programs are broadcast seven hours a day for six days a week and television programs are broadcast one hour weekly. These are stored in audio and videocassettes in the study centers. In the University of the Air, both radio and television programs are broadcast 18 hours a day. These are all recorded and can be listened to and watched by students any time at the study center. The University of the Air conducts FAX tutorials from the headquarters to individual students. The USP has eight regional centers, one in each island: Cook Islands, Kiribati, Niue, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. The USP can conduct satellite tutorials among these places by radio through ATS-1.

In the University of the Air, one study center has one reference room, one reviewing room equipped with 40 AV units for audio and videotapes, five lecture rooms, three laboratory rooms, and one seminar room. The total number of audiocasette tapes is 930 and that of videocassette is 912 in one center. The average number of users for the review room in a center in 1985 was about 25 daily and that of weekends is larger than that of weekdays. Each center has one director, four associate professors and seven non-academic personnel. In total, 300 part-time lecturers teach students at the centers.

The roles of the centers are the following:

(i) to conduct classroom instruction;
(ii) to provide academic counselling;
(iii) to make books and journals available for study and research;
(iv) to make taped lectures available for reviewing;
(v) to provide a place for course examinations to be held; and
(vi) to provide a place for students to meet.

By attending the study centers, distance learning students are motivated to self study, can get tutors and counsellors' aid, and gain human contact at the independent study.

In distance education, study centers are very important for making students study independently and continuously.

Study centers should have the following facilities and equipment:

(i) facilities such as library, lecture rooms, laboratories, seminar rooms, reviewing rooms, counselling rooms and meeting rooms;
(ii) equipment and devices such as audio and videocassete recorders, OHP, radio, TV, electric boards, FAX, computer terminals, microcomputers; and

(iii) educational software such as textbooks, reference books, transparencies, slides, audio and videocassette tapes, floppy disc for CAI courseware.

Existing public schools or institutions might be available as study centers themselves. Facilities, equipment and software should be gradually fulfilled.

The order of their introduction would be different from one situation to another. But generally audiotape and radio may be the first, then video and FAX would follow, and lastly, advanced communication technology such as computer, tele-training system and videotex would be introduced.

D. Multimedia Use in Distance Education

Teachers are using a variety of media in their classroom teaching. They usually use slides, transparencies, other visual educational materials, gestures, radio, TV, audiocassette tape, videocassette tape and recently compact disc, videodisc and microcomputers. Among them, educational software for some media is brought by transportation from remote educational resources to classrooms; others such as radio, TV and computer communication are broadcasted or transmitted directly to the classroom from the remote resources.

In direct distance teaching situations, educational software is gained through a variety of media. Textbooks, audiocassette and videocassette are transported. Radio and TV are broadcasted. FAX and microcomputer software are transmitted directly educational resources to individual students.

Among them, some media have interactive functions, e.g. telephone, FAX, computer communication and CAI. In other media, teaching functions can be expanded by the combination of these multimedia.

However, even if the remote teachers do not participate, students can study independently by themselves. Students can get information through media from remote resources, then respond and get KR. In the latter activities, they can get KR from textbooks or CAI themselves. Textbooks and radio are more cost-effective and telephone is also inexpensive if students can have lines and be served with special distance student reduction fare. In future, computer communication would become more convenient and cheaper.

Table 21 shows what sort of media is utilized in each open university in Asia and the Pacific. All OUs are using printed materials. In

Table 21: MULTI-MEDIA USE IN DISTANCE EDUCATION

	Printed Materials	Study Center	Face to Face Contract	Schooling	Telephone	CMI	TV	Video	Radio	Audio Cassette
BIDE	○	10 TTC	○	○			(○)	Mobile AV Van	30 min x 5/W 40 min x 6/W	○
Andra Pradesh OU (India)	○	28 Colleges	○	○				○	○	○
AIOU	○	10 Regional 150 Local	○				○		300R/Semester 75TV	○
Sri Lanka OU	○	○	○				○		○	
STOU	○	Each Province	○				○	○	○	○
Indonesia OU	○	63	○				30 min/2W		(○)	○
KACU	○	10 Province 15 Country	○	○			1H/W	○	7H x 6/W	○
USP	○	8							PEACESAT Tutorials	○
DDIAE	○	○	○	○	○	○				○
UA	○	6	○		Fax		18 H/Day	○		○

BIDE : Bangladesh Institute of Distance Education
AIOU : The Allama Iqbal Open University
STOU : The Sukhothai Thammathirat Open University
KACU : The Korean Air and Correspondence University
USP : The University of South Pacific
DDIAE: The Darling Downs Institute of Advanced Education
UA : The University of the Air

other words, it seems that printed materials are the most important educational media for distance education. Tutorials in study centers and face-to-face contact are also emphasized in almost all OUs. Human contact is regarded as important even in distance education.

Radio and audiocassette are utilized in almost all Asian and Pacific distance education at higher education level. Therefore the media mix between printed materials and radio or audiocassette is most feasible and practicable. These media are usually utilized in study centers. Some distance education institutions are using video software and TV programs at tutoring sessions or at independent studies. But the application of advanced communication technologies is not widely utilized yet. When a country conducts distance education, several items should be investigated in terms of hardware and software.

Table 22 was summarized by UNESCO ROEAP, which was described in the paper entitled "Planning, operating and evaluating a distance education system".[52] Several teaching techniques was listed down for consideration at the instruction of hardware and software into distance education.

Also, Figure 25 shows a criterion for the selection of a valid media mix at the level of a course of study.[53] This is regarded as a sort of framework when tutorial or teachers in study centers or schools want to select media for mixed use. The selection of valid media mix would depend upon two kinds of contexts, i.e. environmental and learning. As environmental context is concerned, media must be chosen in the light of four criteria such as availability, accessibility, acceptability and economics. As learning context is concerned, media must be appropriate to four criteria such as course objectives, assessment demands, subject matter and instructional strategies.

Figure 26 shows the distance media production system, which includes to combine all media into distance teaching package.[54] In other words, the figure which was summarized in the above reference means the total software production system for media mix. Content and units are analyzed in step 1.0, teaching units are identified in 2.0, unit lesson plans are prepared in 3.0, activities are prepared in 4.0, multimedia are produced in 5.0, tests and evaluation are conducted in 6.0, all media are combined into distance teaching package, development testings are conducted in 8.0 and processes are repeated if anything is wrong. Finally, software is produced as mass products and implemented in 9.0 and course is evaluated.

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[52] UNESCO ROEAP, 1985., *Bull.*, *Ibid.*
[53] UNESCO ROEAP, 1985, Bangkok, *Ibid.*
[53] UNESCO ROEAP, 1985, *Ibid.*

Table 22: ASPECTS OF DISTANCE EDUCATION IN ASIA AND THE PACIFIC PLANNING, OPERATING AND EVALUATING DISTANCE EDUCATION

Teaching Techniques	Consideration		
	Preparation	Production	Delivery
1. Specially written study books (inc. introductory booklets and study charts). Supplementary notes for other media. Books of Readings.	Availability of local writers (imported writers). Availability of instructional designers (imported I.D.'s). Can existing materials be purchased? (translation problems) Copyright, Editing, Graphic Artists, Photographers. Is the unit team approach to be used? Monitoring of teams. Instructional design quality and academic content responsibility?	Reproduction facilities – printing. Scheduling of production. Time constraints on writers (writing, editing, proofing). Production based on quotas. Time constraints on production area. How often can materials be revised? How big is each print run? Storage and cost. Specialist staff.	Post and Courier. Regularity and reliability. Adequate packaging Cost.
2. Textbooks already published.	High purchase price. Ongoing availability.		
3. Journals/ Newspapers.	Availability Cost.		
4. Experimental handbooks (log books).	Technical knowledge. On-site supervisors. Equipment availability.		
5. Slides Filmstrips Film	Technical expertise. Instructional expertise.	Studios.	Student access to replay equipment.
6. Video-tapes Audio-tapes	Technical expertise. Instructional expertise.	Studios. Need for long-term planning.	Student access to equipment. Are audio-tapes to be returned for reuse? Packaging.
7. Radio broadcasts T.V. broadcasts	Technical expertise. Instructional expertise.	Studios. Need for long-term planning.	Fixed time requirements. Broadcast and receiving equipment. Transient nature of broadcasts (need for supplementary material).

Table 22: ASPECTS OF DISTANCE EDUCATION IN ASIA AND THE PACIFIC PLANNING, OPERATING AND EVALUATING DISTANCE EDUCATION (cont'd.)

Teaching Techniques	Consideration		
	Preparation	Production	Delivery
8. Telephone/ satellite tutorials	Teachers. Build into lessons. Respond to requests.	Need to schedule ahead. Availability of study centers. Cooperation of telephone authorities. Should they be recorded for wider distribution?	Loudspeaking telephone.
9. Computing facilities.	Technical expertise in courseware preparation. Use for teaching data processing and systems, or for computer based learning, or computer managed testing.	Compatibility of equipment.	Technical expertise in hardware/software. Computer facilities on-campus and at study centers.
10. On-Campus residential schools.	Teachers. Practical books. Compulsory or voluntary. Duration.		Accommodation and teaching facilities. Travel requirements/ costs for students. Experimental equipment/tools.
11. Off-campus residential schools.	Teachers/supervisors. Practical books.		Teaching facilities. Travel and accommodation.
12. Fieldwork.	Supervisors. Institutions.	Liaison with institutions.	Suitable cooperative firms. Experimental equipment/tools.
13. Self-help study groups.	Leaders.	Assistance from institutions.	Study Centers.
14. Experimental kits.	Designers (academic and instructional.)	Technicians.	Cartage. Breakage. Cooperation of others in the home, power, water supplies.
15. Off-campus Tutorial assistance.	Supervisors.		Study Centers.

Figure 25: CRITERIA FOR THE SELECTION OF A VALID MEDIA MIX AT THE LEVEL OF A COURSE OF STUDY

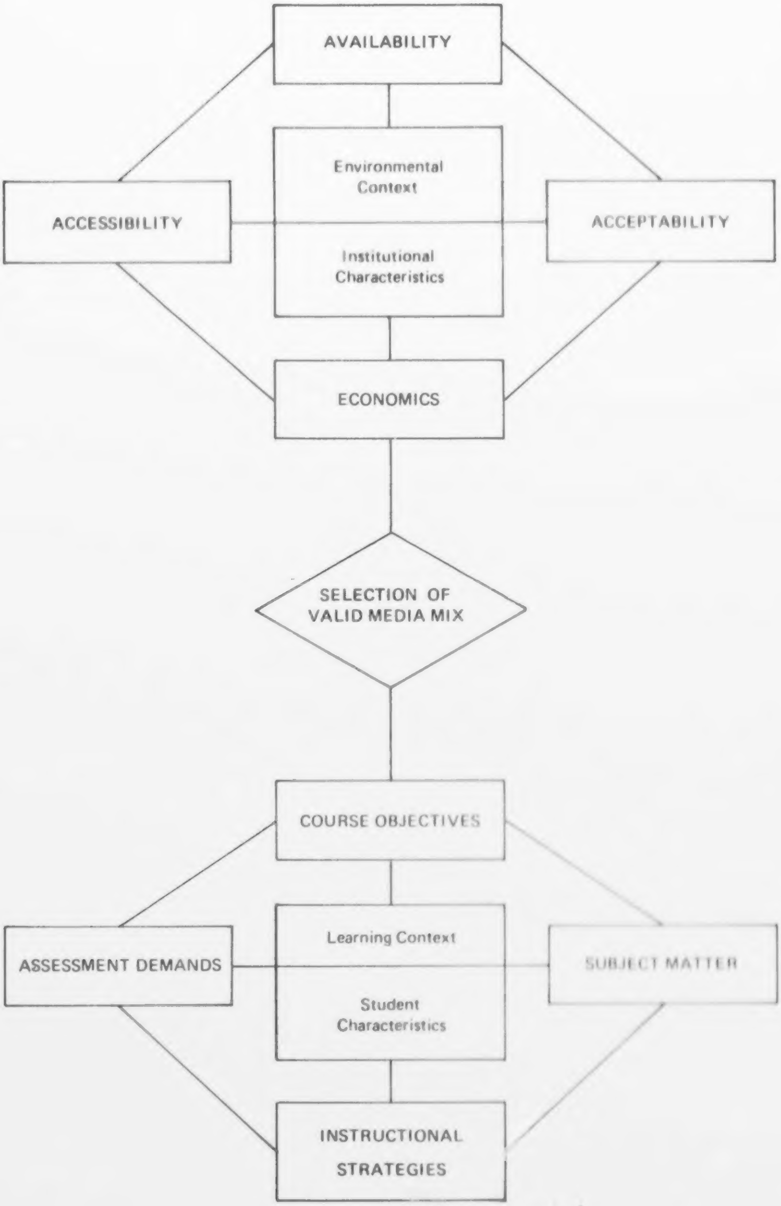
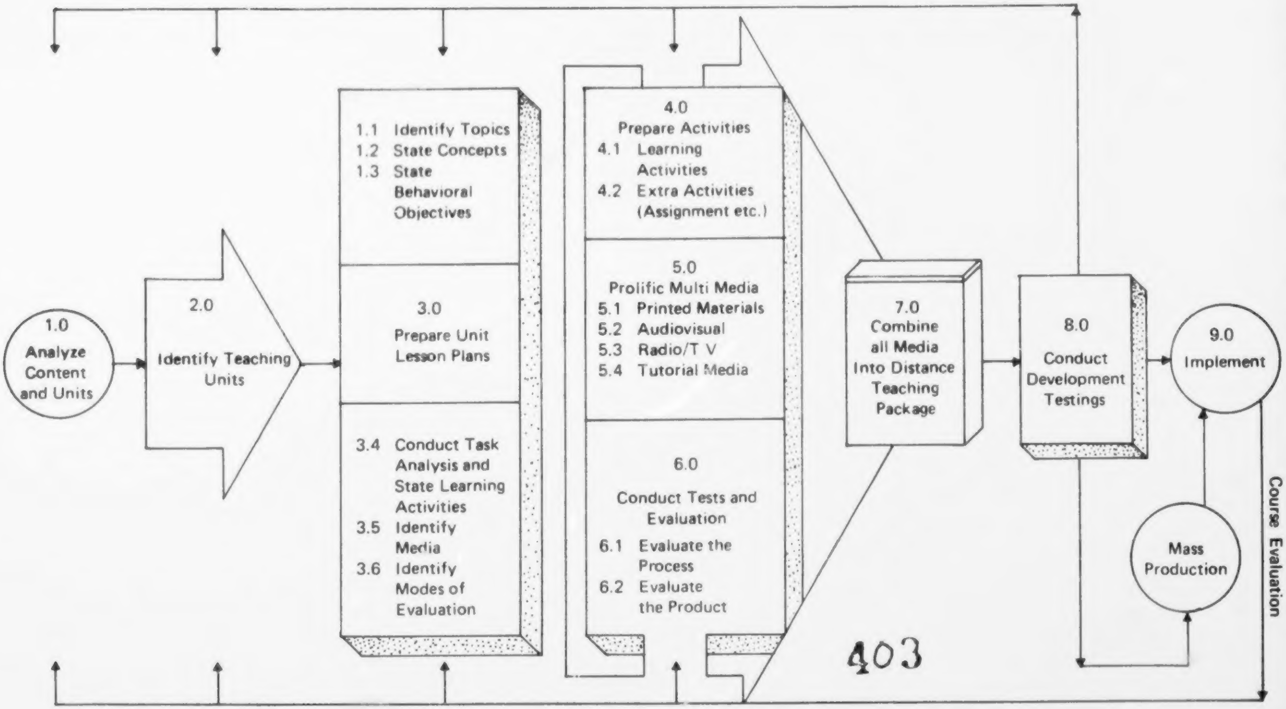

AVAILABILITY
Environmental Context
ACCESSIBILITY
ACCEPTABILITY
Institutional Characteristics
ECONOMICS
SELECTION OF VALID MEDIA MIX
COURSE OBJECTIVES
Learning Context
ASSESSMENT DEMANDS
SUBJECT MATTER
Student Characteristics
INSTRUCTIONAL STRATEGIES

Figure 26: DISTANCE MEDIA PRODUCTIONS SYSTEM


1.0
Analyze Content and Units
2.0
Identify Teaching Units
1.1 Identify Topics
1.2 State Concepts
1.3 State Behavioral Objectives
3.0
Prepare Unit Lesson Plans
3.4 Conduct Task Analysis and State Learning Activities
3.5 Identify Media
3.6 Identify Modes of Evaluation
4.0
Prepare Activities
4.1 Learning Activities
4.2 Extra Activities (Assignment etc.)
5.0
Prolific Multi Media
5.1 Printed Materials
5.2 Audiovisual
5.3 Radio/T V
5.4 Tutorial Media
6.0
Conduct Tests and Evaluation
6.1 Evaluate the Process
6.2 Evaluate the Product
7.0
Combine all Media Into Distance Teaching Package
8.0
Conduct Development Testings
9.0
Implement
Mass Production
Course Evaluation

GENERAL PROBLEMS OF HARDWARE AND SOFTWARE IN DISTANCE EDUCATION

A. Strengths and Weaknesses of Hardware and Software

These communication media and equipment and devices for education have some strengths and weaknesses for distance education. From the viewpoint of hardware, communication media can overcome difficulties on distance, time, space and facilities.

Learners can study at any place they like, whether at home or at working places and at any time they like, whether at night or at weekends, when they use printed materials, tape recorders, VTRs, videodiscs, microcomputers and telecommunication media. Moreover, school campus and building are not always required, when learners independently study at home or at working places. These are big merits due to hardware.

As for software, communications technology could increase both the quality and quantity of education. Learners can continuously get new and high quality information because software transmitted to learners is produced at high level by competent people and at some expense in the highly privileged central organization for software production. This means that the central government can efficiently deliver common and necessary educational contents for the nation to every citizen nationwide.

Software produced for distance education is also distributed by a variety of delivery systems to a lot of learners studying in their local places. Special radio and television broadcast programs are immediately and simultaneously delivered to learners all over the country when coverage is wide, and database storing a large amount of information is also utilized by everyone nationwide when communication network is diffused.

By the strength of hardware and software, some Asian and Pacific countries having many remote islands, mountain areas and rural-dispersed areas can gain tremendous aid to implement educational policies concerning major national problems in Asia and the Pacific, such as education for all, especially universal primary education, literacy training, continuing education, cultivation of national citizenship, promotion of science and technology education, professional support services and educational personnel training.

However, hardware and software in distance education have some weaknesses. From the viewpoint of hardware, there are many such as shortage of hardware, expensive cost for purchasing hardware, if any, compared to the GNP or average income, insufficiency and unreliability of electric supply, narrowness of broadcasting coverage, incompleteness of telephone network and also shortage of technical personnel and appropriate systems for maintaining and repairing hardware.

This sort of weakness particularly would disturb effective implementation of distance education. As far as software is concerned, shortage of human interaction between learner and tutor and among learners themselves, difficulties of immediate question and answer in independent study, necessity of higher motivation in independent study, lack of group study, difficulty in matching time schedule of broadcasting to study time and expansion of centrally-controlled instruction would be considered as weaknesses in distance education, compared to ordinary collective classroom instruction.

In sum, hardware problems concern mainly availability and reliability of distance education and software problems concern mainly effectiveness of distance education. Hardware dissemination depends dominantly upon the fulfillment of the nation's fundamental infrastructure, and software production and distribution depend much on activities of highly qualified personnel. The economic development of the nation and financial support from outside organizations, such as ADB, would be most useful for promoting hardware use in distance education, and staff development programs would be most important for realizing effective distance education.

B. Total System of Hardware in Distance Education

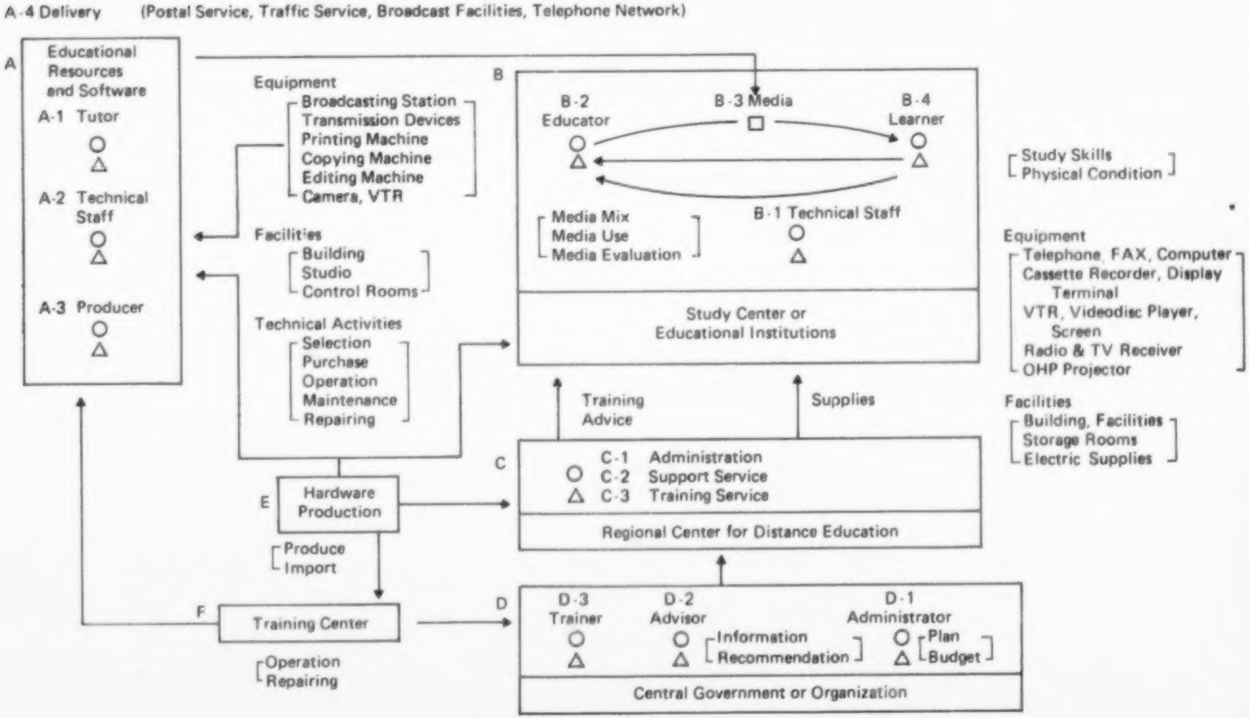
From the viewpoint of organization, a variety of factors are related to the total system of distance education. These are shown in Figure 27 as follows:

(i) Educational Resources;
(ii) Study Center or Educational Institution;
(iii) Regional Center for Distance Education;
(iv) Central Government or Organization;
(v) Hardware Production; and
(vi) Training Center.

The total system of hardware in distance education should be the integration of all sorts of hardware in these organizations.

Educational resources have several kinds of facilities, equipment and devices: (i) facilities such as buildings, studios and control rooms; (ii) production devices such as printing machine, copying machine,

Figure 27: PROBLEMS RELATED TO HARDWARE IN DISTANCE EDUCATION WITH LOCAL EDUCATORS


A-4 Delivery (Postal Service, Traffic Service, Broadcast Facilities, Telephone Network)
A
Educational Resources and Software
A-1 Tutor
A-2 Technical Staff
A-3 Producer
Equipment
Broadcasting Station
Transmission Devices
Printing Machine
Copying Machine
Editing Machine
Camera, VTR
Facilities
Building
Studio
Control Rooms
Technical Activities
Selection
Purchase
Operation
Maintenance
Repairing
B
B-2 Educator
B-3 Media
B-4 Learner
Media Mix
Media Use
Media Evaluation
B-1 Technical Staff
Study Center or Educational Institutions
Study Skills
Physical Condition
Equipment
Telephone, FAX, Computer
Cassette Recorder, Display Terminal
VTR, Videodisc Player, Screen
Radio & TV Receiver
OHP Projector
Facilities
Building, Facilities
Storage Rooms
Electric Supplies
Training Advice
Supplies
C
C-1 Administration
C-2 Support Service
C-3 Training Service
Regional Center for Distance Education
E
Hardware Production
Produce
Import
F
Training Center
Operation
Repairing
D
D-3 Trainer
D-2 Advisor
Information
Recommendation
D-1 Administrator
Plan
Budget
Central Government or Organization

editing machine and VTR and camera; and (iii) transmission devices for broadcasting and telecommunication.

Some Asian countries are sometimes lacking in these resources and suffering from shortage or low quality of hardware. The technical staff who can select, purchase, operate, maintain and repair these hardware are not enough for implementing distance education. Producers also should identify characteristics of hardware for producing good quality of software.

Software produced in educational resources is delivered to study centers through postal services, traffic services, broadcast system and telephone network, etc. These delivery methods are not always well developed in some Asian countries.

In order that software transmitted from educational resources should be received, study centers or educational institutions should have buildings and facilities as well as a variety of equipment and devices. These are receiving devices such as telephone, facsimile, cassette tape recorder, videocassette tape recorder, videodisc player, radio and TV receivers, OHP projector, computer display and screen, etc.

In some countries, the distribution of these devices is not enough for receiving software delivered from educational resources to study centers. There are schools without electric supplies in rural areas.

Educators should integrate traditional media and new media into their teaching, operate hardware effectively and evaluate their effectiveness in the study center or schools. But competent educators who can do these activities are also limited. Many teachers are not experienced especially in new media application.

In other words, learners should often operate terminal devices by themselves. They need adequate study skills for operating devices, but some of them are not so skillful in operating devices and some may be physically handicapped.

Activities in study centers and schools are assisted by regional centers for distance education. Administrators may distribute adequate and enough sets of hardware for distance education to study centers and also may frequently provide supplies. Professional staff may help technical staff in the study centers or schools to repair terminal devices and may give advice or recommendation to personnel in schools.

Advisers in the regional centers may also train technical staff in study centers and schools for operating and repairing [illegible]rdware.

Moreover, staffs in the central government or organization plan the hardware use in distance education, prepare budget, give information and recommendations to the study centers, and train technical staffs both in the study centers and educational resources at the central training institutes.

Hardware itself may be produced or imported in some Asian countries from other countries. Quality is not always good and parts for maintenance may often be limited.

C. Total System of Software in Distance Education

The total system and its components in terms of software in distance education is shown in Figure 28.

Several problems concerning software are included in these components and their relationships. At educational resources and software productions, tutors on audio and videotape, or radio or TV programs need to have excellent presentation skills. Concerning talk, sound effects, visual presentation, etc., they must be more experienced and skillful than educators in the study center using this kind of educational software. Technical staffs help them by advising on presentation methods, by editing texts and by implementing camera works, sound effects, arts and lighting.

Producers should design and produce educational software through formative evaluation. Main products are printed materials, transparencies, slides, human voice, visual image, floppy disc for CAI, videotape, audiotape and radio-TV programs.

The advisory committee advises, recommends and evaluates educational software. Committee members usually consist of representatives from users, government or central organizations and productions. The committee identifies needs and requirements in users and educational objectives intended by governing bodies and shows the fundamental guidelines for producing educational software. Educational software produced by educational resource in software production is delivered to the study centers through various kinds of vehicles.

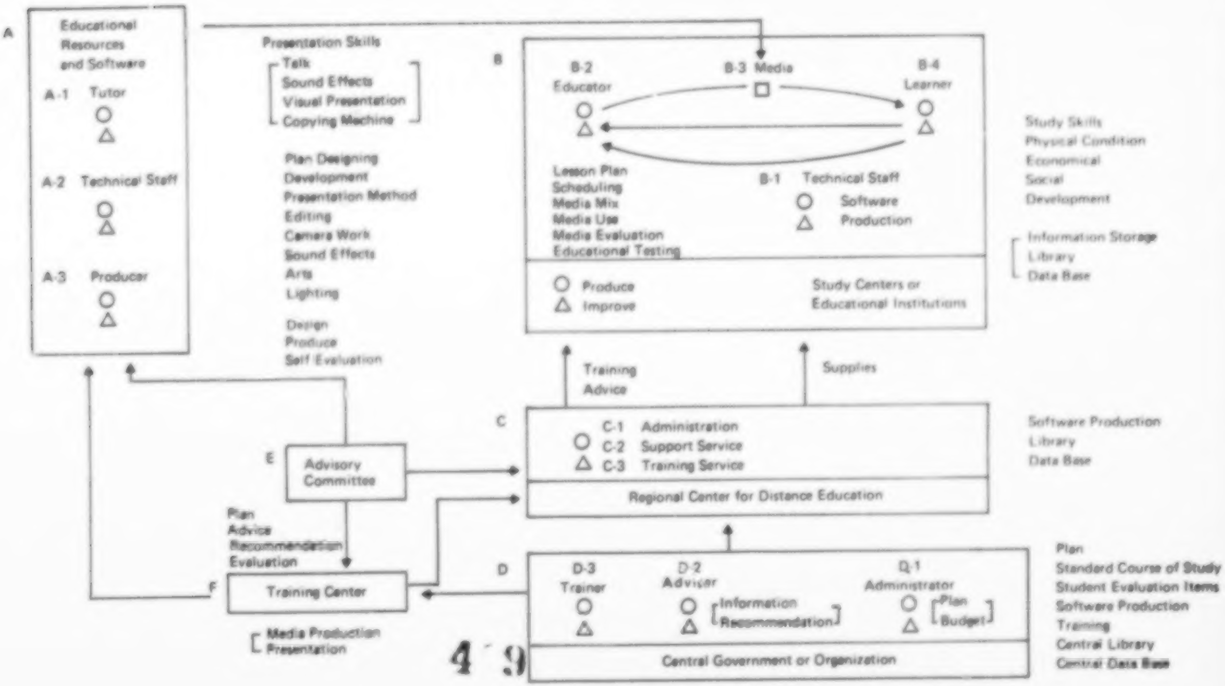
Radio and TV programs are immediately and simultaneously delivered to all study centers nationwide. Human voices and data are delivered immediately to a study center from the educational resources. But printed materials, transparencies, slides, tape, videotape, floppy disc, etc. take more time to be delivered. Usually three to five days are needed by postal service.

At the study centers and educational institutions, educators should design lesson plans including media mix and media use, make scheduling of media use, and evaluate effectiveness of media and learners' performance using media.

Sometimes educators improve educational software by themselves. For example, they cut some segment of TV programs off, or they add some segments to the original program, or they combine different parts of different programs in one. Of course, educators can produce their

Figure 28: PROBLEMS RELATED TO SOFTWARE IN DISTANCE EDUCATION WITH LOCAL EDUCATORS

A-4 (Printed Material, Transparencies, Slides, Floppy Discs, Videotape, Audiotape, Voice, Visual Images, RTV Programs)


A
Educational Resources and Software
A-1 Tutor
○
△
A-2 Technical Staff
○
△
A-3 Producer
○
△
Presentation Skills
Talk
Sound Effects
Visual Presentation
Copying Machine
Plan Designing
Development
Presentation Method
Editing
Camera Work
Sound Effects
Arts
Lighting
Design
Produce
Self Evaluation
B
B-2 Educator
B-3 Media
B-4 Learner
○
△
□
○
△
Lesson Plan
Scheduling
Media Mix
Media Use
Media Evaluation
Educational Testing
B-1 Technical Staff
○ Software
△ Production
○ Produce
△ Improve
Study Centers or Educational Institutions
Study Skills
Physical Condition
Economical
Social
Development
Information Storage
Library
Data Base
Training
Advice
Supplies
C
○ C-1 Administration
C-2 Support Service
△ C-3 Training Service
Regional Center for Distance Education
Software Production
Library
Data Base
E
Advisory Committee
Plan
Advice
Recommendation
Evaluation
F
Training Center
Media Production
Presentation
D
D-3 Trainer
○
△
D-2 Adviser
○
△
Information
Recommendation
Q-1 Administrator
○
△
Plan
Budget
Central Government or Organization
Plan
Standard Course of Study
Student Evaluation Items
Software Production
Training
Central Library
Central Data Base

own educational software by themselves. Then technical staffs in the centers can help and support educators to produce their own educational software.

The centers should have a library and database for information of educational software and software itself. Especially the database is most useful because educators can retrieve suitable information on lesson plan, media, test items, presentation materials, readiness and performance characteristics of target learners.

Learners have a variety of backgrounds, such as economic, social, cultural and physical. According to these backgrounds, their selection of educational software and use of software must be affected. Also learners should have study skills for educational software. For example, they must be competent to understand TV programs effectively and to express their opinions after watching TV programs.

These activities in the study centers and educational institutions are supported by the Regional Centers for Distance Education. Regional centers should have large libraries and database for educational software from printed materials to CAI courseware and sometimes produce their own educational software.

Administration in the regional centers should design plans for supporting, maintaining, storing and distributing educational software adequately. Consultants and advisors can show to educators in the study centers how to get educational software, how to use them, which educational software is good, etc. They also train educators for software selection, software use, software design, software production, database construction according to the requests from educators in study centers and recommendation from Central Advisory Committee for Distance Education.

At the central bodies, administrators may plan the standard course of study and standard evaluation items, plan and implement standard teacher-training curriculum, construct budget plan and legislate related acts for promoting educational use of media and technologies in distance education. Advisers can give information and recommendation to officers of regional centers and trainers in central training centers. Moreover, the central organization should have a large scale of libraries and database for educational software.

At the central training center, tutors, technical staff and producers in educational resources, and staff in the regional centers are trained according to the recommendation of the advisory committee and the plans of the central government organization.

In some Asian countries, activities related to educational system of software in distance education are not always adequately conducted.

Main problems concern quality and quantity of educational software, delivery, database and maintenance of educational software, production system, and quality and quantity of staff and training for staff in every component of distance education.

D. Problems Related to Hardware in Direct Distance Education

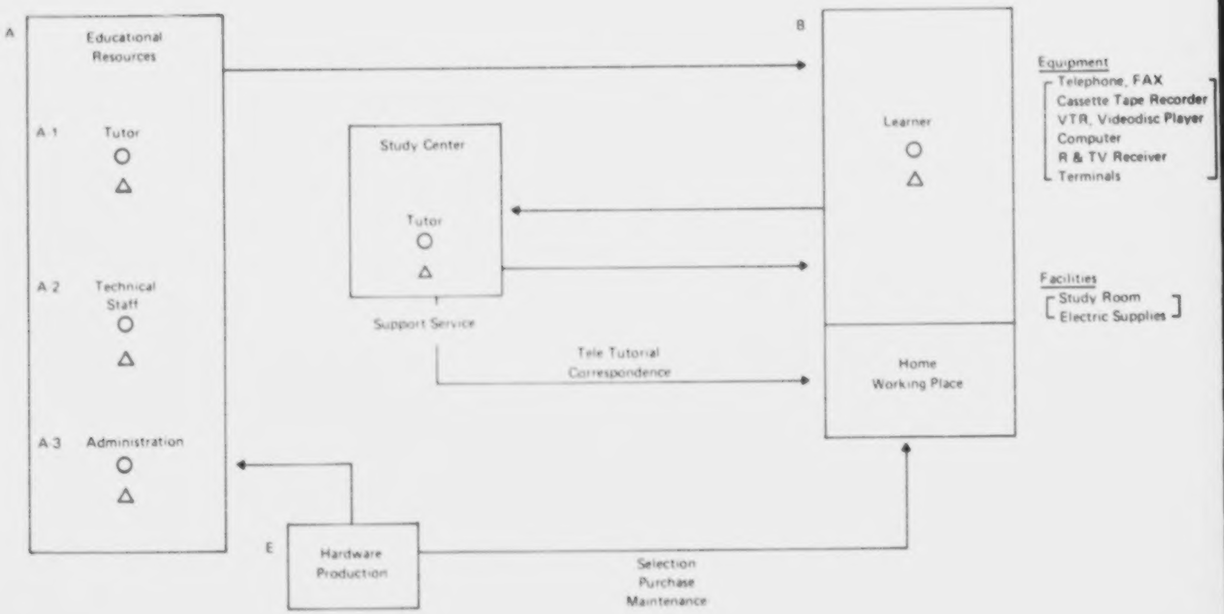
In the direct distance education, some relationships among components in the total distance education system are modified as shown in Figure 29. Three-way communication would be conducted between learners at home and tutors in educational resources rather than between learners and tutors both in study centers, and hardware is directly utilized by individual learners rather than tutors and technical staff in study centers.

Learners at home or working places should study independently using educational equipment and devices. They must have expensive equipment by themselves. For example, telephone, facsimile, çassette tape recorder, videocassette recorder, radio, television, computer terminals and microcomputers are devices well utilized in direct distance education. They should select, purchase or borrow good and appropriate devices and maintain and utilize them effectively. When they use telephone, FAX and computer, they can keep three-way communication to tutors in study centers, in regional centers even in education resources themselves. Specifically, learners receive the first way of communication from the remote educational resources, return their responses to tutors in study centers and then receive KR information from the tutors in study centers.

The first delivery from the educational resources to learners is conducted through postal services, traffic services, broadcast network or telephone network. The second and third communication between learners and tutors in the study centers are done by postal services or by telephone, FAX and computer, if available. There are many difficulties in getting suitable hardware at individual homes in Asian countries nowadays. When learners study independently in the study centers, they can use more equipment for their study and get support services from tutors and technical staff.

Figure 29: PROBLEMS RELATED TO HARDWARE IN DIRECT DISTANCE EDUCATION

A-4 Delivery (Postal Service, Traffic Service, Broadcast Facilities, Telephone Network)



A
Educational Resources
A-1
Tutor
○
△
A-2
Technical Staff
○
△
A-3
Administration
○
△
Study Center
Tutor
○
△
Support Service
Tele Tutorial
Correspondence
B
Learner
○
△
Home
Working Place
Equipment
Telephone, FAX
Cassette Tape Recorder
VTR, Videodisc Player
Computer
R & TV Receiver
Terminals
Facilities
Study Room
Electric Supplies
E
Hardware Production
Selection
Purchase
Maintenance

E. Problems Related to Software in Direct Distance Education

In direct distance education, learners should study independently at home or at working places, as shown in Figure 30. They need higher level of study skills for independent study. For example, they must design study plans by themselves, conduct self-study and self-evaluation. These are essentially activities of tutors in study centers. In independent study, learners must play tutors' roles as well as learners' roles. Learners should also select and use educational software and schedule study time by themselves. In these cases, learners' situations must be carefully taken account of.

For example, cost of educational software, family condition for independent study, condition of physically handicapped and level of illiteracy are important aspects for selecting suitable software. Tutors in study centers also must consider these conditions in learners for receiving responses and giving KRs to learners.

F. Major Problems and Causes in Hardware and Software in Distance Education

It seems that the main problems in hardware and software in distance education in Asian and Pacific countries are:

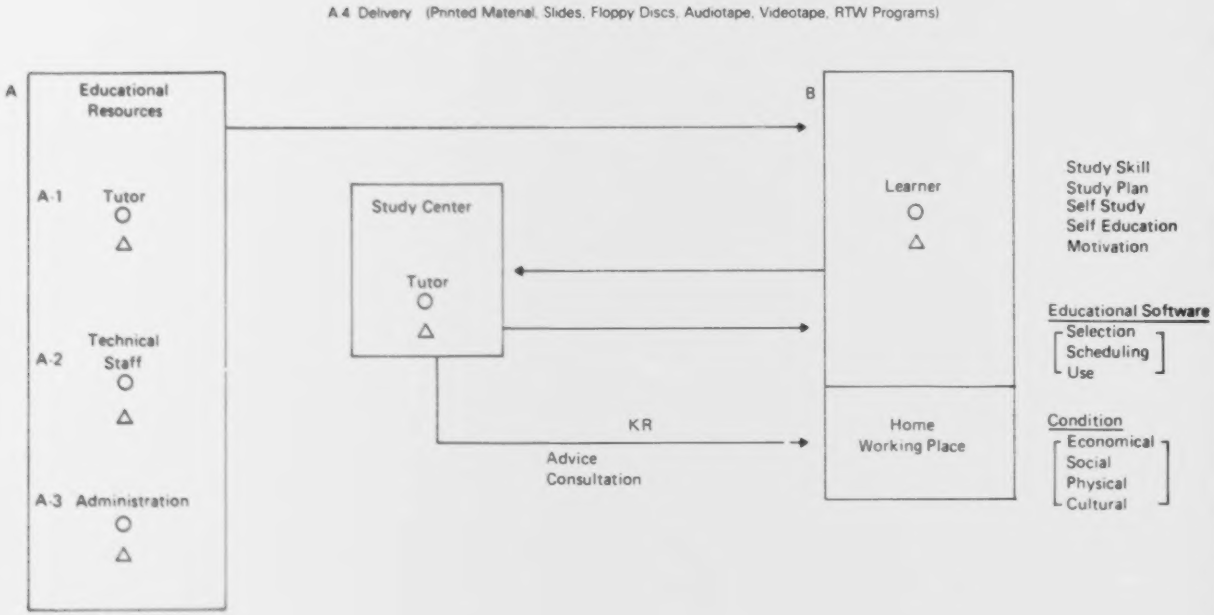
(i) Shortage of hardware and software production;
(ii) Difficulty in hardware and software delivery; and
(iii) Insufficient experiences on hardware and software use in distance education.

Though some countries produce hardware and software, most of them are not enough for producing higher level of technological products. In some countries, delivery system is now expanding nationwide but in many Asian and Pacific countries delivery of educational software is insufficient especially in rural areas. Tutors and learners in study centers and individual learners at home are not well provided with a variety of hardware and software in rural areas.

These phenomena seem to come from the following causes:

(i) Clear policies and strategies for promoting hardware and software in distance education are not easily established in most Asian and Pacific countries. There are many more important and emergent activities for developing each coun-

Figure 30: PROBLEMS RELATED TO SOFTWARE IN DIRECT DISTANCE EDUCATION


A.4 Delivery (Printed Material, Slides, Floppy Discs, Audiotape, Videotape, RTW Programs)
A
Educational Resources
A-1 Tutor
○
△
A-2 Technical Staff
○
△
A-3 Administration
○
△
Study Center
Tutor
○
△
KR
Advice
Consultation
B
Learner
○
△
Home
Working Place
Study Skill
Study Plan
Self Study
Self Education
Motivation
Educational Software
Selection
Scheduling
Use
Condition
Economical
Social
Physical
Cultural

try. Maintaining food, energy and good environment, enhancing human health and keeping the quality of life are the countries' most important national tasks. Therefore, it would be rather difficult for distance education to be placed in higher position at priority level for development than these activities.

(ii) Fundamental infrastructure should be constructed before promoting hardware and software technologies in distance education in many Asian and Pacific countries. For example, electric supplies, expansion of telephone network to houses and educational institutions, extension of roads and increase of coverage in broadcast networks are first necessary for especially isolated areas such as rural areas, islands and mountains in many Asian and Pacific countries. Then, delivery system of hardware and software in distance education would be attained.

(iii) Even if nations have standard curriculum for education, most of them do not include the obligation of hardware and software use in distance education. Therefore, use of hardware and software is not always compulsory in distance education.

(iv) Cost of hardware and software is still expensive in most Asian and Pacific countries. Narrowness of marketplace, shortage of average income, import of products, time consumption especially for developing software products, are also factors affecting promotion of hardware and software in distance education.

(v) Many Asian and Pacific countries are suffering from shortage of experienced staff for hardware and software development in distance education.

Administrators in regional centers, study centers and educational resources should be trained in terms of design, implementation, evaluation and budgeting for hardware and software. Especially hardware and software supplies and database for educational software are important for maintaining good quality distance education in information-based society.

Tutors in regional center, study centers and educational resources should also be trained for operating hardware, using software, designing media mix. Producers must study characteristics of target learner and production techniques.

Shortage of experienced trainers or advisers are very serious in many countries. Difficulties of technology transfer are also obstacles for increasing trained staff. Trained staff could get better salaries. Therefore, they are usually unwilling to convey their know-how and skills to untrained colleagues and want to keep their know-how secret and consider their competence as unique. One more factor obstructing technology transfer is the specialist-oriented mind in many Asian and Pacific countries.

In new developing technological society one person should have multifunctional specialities, but sometimes administration staffs are unwilling to study technical activities. Therefore, the total system has difficulty in functioning because it limits every activity into specialist ones. If someone is out, the system would not work. But if somebody takes the place of another one's function, the total system can work continuously . Voluntary distribution of technical knowledge and know-how is very important for supporting and promoting hardware and software in distance education.

INNOVATION IN DISTANCE EDUCATION

A. Transforming Distance Education

Distance education should overcome the constraints of space and time between educators and students. Concerning space constraints, distance gaps between them would be filled by means of communication such as transportation, broadcast and transmission. In order that space is overcome, communication must be done immediately. Broadcast, FAX and electric board have such functions. Postal services need some time. Where students are motivated to study, they could accept delayed feedback. Unfortunately feedback delay sometimes causes dropout. As the cost of postal services is inexpensive, this vehicle is widely used. Quicker services would be acquired by special discount express service for distance students.

Regarding time constraints, students can access educational resources any time they like. They can visit study centers, watch TV or listen to audiocassettes when they have time. When they have suitable equipment and devices at home, they could get educational software more freely. These kinds of effective distance education need expensive investment. Everyone cannot always study in such an ideal situation.

In order to get an ideal situation, step-by-step development should be planned. Table 23 shows the steps of development for distance education.

At Stage 1, printed materials are delivered to study centers or individual study places by transportation. These printed materials function as enrichment to study in libraries and as main educational resources in individual study.

Table 23: STEPS OF DEVELOPMENT FOR DISTANCE EDUCATION

Stage of Development	Educational Software	Vehicle	Function of Software	
			Group in a Study Center	Individual at Home
1	Printed Resources Textbook Reference Book Test Item	Transportation	Library Correspondent Materials	Main Materials Study Room
2	Teaching Materials Map Model Kits	Transportation Post Traffic	Learning Study Center	Study Study Room
3	AV Materials Slide TP Audiocassette Videocassette Videodisc	Transportation	Teaching	Self Study
4	Programs Radio TV Teletext	Broadcasting	Enrichment of Teaching	Direct Teaching
5	Communication Electric Boards FAX Videotext VRS Microcomputer	Transmission	Direct Teaching	Distance Tutorials

At Stage 2, teaching materials such as maps, models, kits, etc. are sent to study centers and individuals by transportation. Students learn from them at the center and study at the study room.

At Stage 3, audiovisual materials such as slides, transparencies, audio and videocassettes are transported to students. Teachers at study centers use them for teaching students and individual students study them by themselves.

At Stage 4, broadcasting programs are broadcasted to students. Teachers can enrich their teaching at the center and students can be directly taught by distance teachers at home.

At Stage 5, communication media such as electric board, FAX, videotex, VRS, microcomputer are transmitted to students. Both students at centers and at homes are directly and interactively taught through education software at a distance.

B. Transforming Distance Education Through New Media

When new media are introduced to education and produce results, a considerable change will take place in various aspects of distance education.

Education will expand. As two-way real-time exchange of information will be made possible through the new media, students will be able to study exchanging information not only with classmates in the same classroom but also with students in other classes and even with teachers and students of other schools at a distance. Furthermore, as the education material database may contain answers made by students previously, it will be possible for the students to communicate with those who studied in the past, thus transcending time.

Educational materials will be improved in quality and increased in quantity. Educational materials prepared by a teacher are limited in quality and quantity. On the other hand, when educational material databases are completed, materials of good quality prepared through joint efforts of excellent educators will be made available in great variety and large quantity. Then, teachers will be able to use them at a distance as they choose. The benefits will be very great.

A large amount of information will be put into circulation and shared by a great number of users. When the educational information databases are completed, they will become common property of all teachers throughout the nation. Whenever neccesary, the users will be able to retrieve information required through advanced communication media, collect information from broadcast new media, and obtain information stored on floppy discs, videodiscs and other media of the package type.

As a great variety of teaching materials will be stored in the databases, the users will be able to select materials most suitable for the learners. Besides, education materials can be reproduced in various ways: projected on CRT and on the screens, and reproduced on sound systems. Therefore, with these media, it will become easier to give personal guidance to each learner according to his competence and needs.

The new media will promise equal educational opportunity to every learner, but at the same time they may cause disparity in achievements of students.

If distant educational databases will be made available to all teachers and learners, equal educational opportunity will be guaranteed as a matter of form, which is a commendable goal. However, if some teachers do not use them or cannot make full use of them, the students under those teachers are put at a disadvantage, compared with the students under the teachers who make efficient use of the databases. In this way, the new system may widen gaps between classes or between schools. In order to prevent such a situation, both teachers and students should be fully trained on how to use the new media in education.

C. Recommendations

The fifth Asian and the Pacific seminar of APEID on Educational Technology in 1986 listed down 13 items of recommendation in the final report. Seven items are recommendations for promoting regional cooperative activities on the problems in APEID. Six items related to recommendations concerning more operational problems of advanced communication technologies in distance education. There are provisions of adequate infrastructure for effective delivery of quality education for all, update of directories on experts, research on software and hardware and emphasis on both new technologies and traditional low-cost media.

Also working group meeting on use of advances in communication technologies for higher education purpose in 1985 listed down seven recommendations. These concern optimum utilization of published information, case study of successful models, research and development on the related technologies, cooperative production of courseware, workshop for skills development, in-service awareness and familiarization course, and consultancy and technical working meeting.

Skills to be trained in workshop are as follows:

(i) instructional design and development;
(ii) systems design and development;

(iii) educational uses of specific technologies, for example, assessment, item banking, etc; and

(iv) management use of specific technologies, for example, accounting, management information systems, registration, etc.

In this report, the following are some suggestions for promoting hardware and software issues in distance education.

1. Issues concerning hardware

a. Infrastructure for establishing effective distance education would be constructed before introducing advanced communication technologies, according to the countries' policies and plans. For example, distribution of electric supply, expansion of telephone network, increase in coverage of broadcasting, appropriate extension of traffic roads, special reduction service of postage for distance students, and establishment of broadcasting stations and production centers should be gradually accomplished.

b. Hardware for supporting communication technology would be introduced in educational resource institutions, regional centers, study centers, schools and learners' homes. For example, telephone, FAX, radio and TV receivers, audiocassette recorders, videocassette recorders, videodisc players, microcomputers, terminals for videotex, etc. should be promoted to be produced or imported.

c. Use of traditional and low-cost hardware is more important in some countries. For example, combination of printed materials, picture books and audiotape recorder may be basic and useful system for distance education. Radio also can help this type of distance education by supplying batteries or generators even in rural areas. In the study center, radio vision or the combination of audiocassette, OHP and slide projector is also useful media.

d. In terms of three-way communication, telephone, FAX, teletraining system, electronic mail, interactive telecommunication should be introduced in near future.

2. Issues concerning software

a. Software for supporting distance education should be produced cost-effectively. For example, financial aids for purchasing good educational material and educational software, and standard which study centers and schools should have, would be useful for promoting distance education. Private sectors could produce more and better products by such government support.

b. Educational radio and television programs would be broadcasted for more hours in each channel. For example, establishment of specialized educational channel would have possibilities to promote distance education drastically.
c. Evaluation standard would help teachers and learners in selecting and utilizing good educational software.

3. *Issues concerning staff development*

a. Every kind of staff must be carefully trained.
b. Distant learners should be trained on study skills for distance education.
c. Educational tutors in study centers must be trained on how to use terminal equipment such as telephone, FAX, cassette records, display terminals, VTR, videodisc players, radio and TV receivers, etc. They also should know how to design lesson plans, how to make schedules, how to mix, use and evaluate media, how to select good media, etc.
d. Tutors in educational resource institutions should be trained for implementing effective presentation and for designing software.
e. Technical support staff should be trained for conducting production technologies effectively such as editing, camera work, sound effects, arts and lighting.
f. Producers must also study how to design, produce and evaluate software.
g. Consultants in regional centers for distance education also must be trained for effective consulting and for knowledge of hardware and software in distance education.

4. *Issues concerning systems*

a. Total systems including educational resources, study centers, regional centers, cultural organizations and training centers, advisory committee functions for distance education should be constructed.
b. Database for information on distance education must be constructed. Database includes not only information on reference of distance education but also information on hardware and software, and software itself.

5. *Issues concerning activities by ADB*

a. Seminar on technical assistance in the regional meetings would be helpful for promoting distance education in the region.
b. This sort of seminar should be repeated every year or every two years by the same members. At the first meeting, everyone can know other countries' problems and situations. Therefore, in the next meeting, recommendations and operational future plans will be gained more easily.
c. Database on experts, hardware, software, systems would be constructed in the ADB.
d. ADB may help people for visiting successful models in other countries.
e. ADB may support international cooperative educational software production.

Appendix 1

SURVEY ON IMPLEMENTS AND ROLES OF EDUCATIONAL BROADCASTING, USE OF NEW TECHNOLOGY, AND CATEGORIES OF EDUCATIONAL PROGRAMS CONDUCTED BY NHK AT JAPAN PRIZE CONTEST IN 1985

	ORGANIZATIONS COUNTRIES	ASIA										OCEANIA	
	ITEMS	NBA Bangladesh	HKETV Hong Kong	RTHK Hong Kong	TVRI Indonesia	JOUD-TV Japan	NHK Japan	KBS Korea, Rep. of	EHS Malaysia	PCTV The Philippines	SLBC Sri Lanka	ABC Australia	SBU Fiji
I. ROLES OF EDUCATIONAL BROADCASTING	1. Promoting a sense of citizenship, national unity	○							○	○	○		
	2. National modernization	○									○		
	3. Promoting national language(s)	○		○	○				○	○	○		
	4. Supplement of education at school		○	○	○	○	○	○	○	○	○	○	○
	5. Informing schools quickly of new information	○		○			○		○		○		
	6. For common educational level and content throughout the country	○	○	○	○		○	○	○		○	○	
	7. Instead of constructing new high schools and universities												
	8. Supplementing the number of qualified teachers	○									○		
	9. Supplementing educational materials in short supply				○					○	○		
	10. Modernizing the educational materials instructional methods	○				○	○		○	○		○	
	11. Conducting on-the-job training of teachers	○									○		
	12. Providing education and information for minority groups			○			○	○					
	13. Educating those who cannot afford to attend school			○						○	○		
	14. For preparatory studies for qualification tests by the government							○			○		
	15. Others						○	○	○	○			○
II. IMPEDIMENT TO THE DEVELOPMENT OF EDUCATIONAL BROADCASTING	1. Insufficient budget, personnel	○	○	○	○			○	○	○		○	○
	2. Lack of broadcasting organizations' interest												
	3. Lack of government's interest			○								○	
	4. Limited coverage			○	○				○	○	○		
	5. Lack of electricity	○							○		○		○
	6. Teachers' indifference			○					○		○		
	7. Insufficient TV/radio receivers in educational establishments	○								○	○		○
	8. Insufficient hour for educational broadcasting			○						○			
	9. Lack of coordination of TV/radio and school schedules							○					
	10. Others							○	○	○			

Satellite Applications in Distance Education Through TV and Radio

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INTRODUCTION

This Paper examines the scope for satellite applications in distance education through television and radio.

The Paper first outlines the rationale for using the electronic media and satellite systems for education. This is followed by a review of technological trends in satellite communication, particularly those relevant to applications for education.

The Paper gives an overview of the use of satellite systems developed for education in the world. The Indian experience, including the lessons learned in the Satellite Instructional Television Experiment is reviewed to bring out the nature and dimensions of the challenges involved. The Chapter then looks at the potential in Indonesia which has made impressive experiments with its Palapa domestic system. This is followed by a study of the situation in the South Pacific where some initiatives as in Fiji and the University of South Pacific have indicated the need to introduce space technology for education.

The selection of India, Indonesia and the South Pacific has been made in view of their satellite experiments and applications and does not reflect any priorities vis-a-vis other countries. The review, it is hoped, will give some idea of the challenges involved and the potential benefits to any country in the region deciding to try satellite technology. The next Chapter, System Design and Operations, attempts to list the various considerations that are to be examined in deciding the configuration of country-specific programs involving satellites and distance education. Lastly, some key issues and suggestions for action are indicated.

The views expressed in the Paper are those of the author and in no way reflect those of the Asian Development Bank.

THE RATIONALE

Recently a newspaper item disclosed that a communication satellite will soon be capable of transmitting data equivalent of the Encyclopedia Britannica across the Atlantic once every three seconds! This news was soon followed by a report from the South Pacific. In Vanuatu, a school teacher travelled by canoe from his island to the mainland of Malekula, walked 15 km to the airport radio to order some books and then returned the same way. The news report added that the teacher did this every month as part of his duties. The two items dramatically illustrate the gap between satellite technology and its educational applications.

There is a view that sophisticated technology can be adopted only step-by-step by developing countries. The reason why such a conservative approach often proves counterproductive was ably explained by the noted Indian scientist, the late Dr. Vikram Sarabhai.[1]

> ". . . a developing nation following a step-by-step approach towards progress is landed with units of small size, which do not permit the economic deployment of new technologies. Through undertaking ventures of uneconomic size with obsolete technologies, the race with advanced nations is lost before it is started."

Fortunately, many countries are in a position to start with a clean slate. And the developing countries have demonstrated their capability to take quantum jumps to attain new levels of technology. Viewed in this context, trends in satellite technology, though enormously complex and costly, acquire some relevance to developing countries. When the Atlantic was spanned by a satellite, no one was sure that in about ten years the technology would work in many developing countries. Growing population trends in these countries have made it all the more urgent for them to try new methods of upgrading their human resources.

A. The Role of Satellites

The success of the international telecommunication links via satellites prompted the use of space technology in domestic systems. Several countries perceived definite advantages of space applications:

- The entire country can be covered in one step;
- The links are extremely reliable and clear;
- The reach of radio and television can be increased and their round-the-clock quality ensured;
- The satellite offers a medium diversity, where land links are in operation;
- The satellite is flexible since its links can generally be changed as desired;
- Remote areas, islands, mountain regions and difficult terrain can be easily covered;
- The costs are distant-independent; and
- Several services like telephone, telex, data and television can be provided from space.

---

[1] Address to the U.N. Conference on the Exploration and Peaceful Uses of Outer Space, 1968.

The application of satellite technology in support of distance education will be useful both in terms of quantity and quality. Satellites will help expand the reach of radio and television. The conventional, terrestrial means of communication are too slow and cannot cover all parts of a country adequately; microwave links, for instance, have often to be laid across difficult terrain and need constant maintenance. Landlines of communication are often noted for their proverbial uncertainty. If distance education were to cover the largest number, a satellite link can easily connect rural areas, remote centers and backward regions with the urban centers. Space technology offers a means of reversing the trend of development that often treats the urban areas as the center and spreads to rural areas slowly. The new technology also changes the priorities. It is possible to give attention to the underprivileged people without succumbing to the pressures of the urban elite in the matter of providing educational opportunities. Without the wide reach of satellite, television and radio tend to become urban-oriented and elite-centered. Further, as a means of expressing a national identity, a satellite can provide a rallying point for unifying people of diverse cultures and help subdue social forces of disintegration. As it becomes possible to send a point-to-multipoint message simultaneously, the satellite system can address separate regions or audiences widely dispersed but professionally united. Teacher-training, for example, becomes possible on a large scale without uprooting the teachers from their place of work.

In terms of quality, the use of satellite in educational radio and television would be most useful. If distance education programs are oriented to specific goals such as improvement of skills in agriculture or industry, the importance of visuals cannot be stressed too strongly. Where visuals are crucial (e.g. in "how to" programs) and where voices matter (of participants as well as those of tutors), satellites can facilitate the infusion of inputs from various sources. The "visual lexicon" can add a new dimension to the learning process, be it an experiment in a distant laboratory or a novel technique in a nearby factory. Scarce resources – human and machines – can be pooled and the entire audience in the network can have the benefit of a good teacher or a good visual.

The cost-effectiveness of satellite systems has to be considered from the viewpoint of benefits that are otherwise not possible in the foreseeable future for many countries, given their state of telecommunication development. While the initial investment on ground stations and the lease of the space segment will no doubt be relatively heavy, it is relevant to recall that the transistor revolution of the 1960s and the solid state revolution of the 1970s have resulted in a hundred-fold (more in some cases) decrease in costs in the electronic items that go into several modern educational appliances. Another crucial factor is the spread of telecommunications network, often improved on modern lines, facilitates the provision of satellite broadcast system for a little extra investment.

The case for the satellite medium deserves to be examined on merits, without any *a priori* judgments on its sophisticated or cost. It is not claimed that satellite is relevant for all countries; nor can it be stated that satellite alone would be able to deliver the educational message. Actually, the best results are obtained in an imaginative mix of satellite and terrestrial systems. In view of the challenging task of providing education to an ever-increasing number of students and of upgrading the human resources on a massive scale, "The question is not whether developing countries can afford the peaceful uses of outer space. Rather, it is whether they can afford to ignore them."[2]

B. The Role of Television

While the utility of space technology is generally accepted, the role of television is not free from controversy. The very relevance of the electronic media to education is questioned and its applicability to developing countries is judged in terms of the negative experience of a few Western countries. While radio is generally acceptable, television is not. The case against the use of television for education is based on the following reasons:

- Television is no doubt a technologically brilliant medium but it is a format for entertainment, not for education as it is inherently hostile to thought.
- It is in the nature of the medium to trivialize everything it touches and to free the viewer from the obligation to think.
- All ideas are reduced to a lowest common denominator. Television image is one of "low definition" and offers little detail.
- Television suppresses the content of ideas in order to accommodate the requirements of visual intent, i.e. to accommodate the values of show business.[3]
- Television is a low involvement medium; students will be required to do nothing more than watch and television viewing produces an alpha brainwave pattern state (relaxed, inattentive condition).

---

[2] *Report on the Application of Space Technology to Development*, United Nations, 9 June 1971.
[3] Postman, Neil, *Amusing Ourselves to Death: Public Discourse in the Age of Show Business*, Viking.

- Television is synonymous with entertainment and commercials; it is difficult to treat it for serious business.
- Educationists may have brilliant ideas of teaching but they have to accommodate them to television and not vice versa.

The advocates of television for education cite the following points:

- Electronic communication is a fundamental change on a par with previous great revolutions such as writing, printing and the telephone and will result in the most far-reaching changes in social progress.
- Many educationists have realized that a piecemeal approach to television results in the waste of a most powerful educational tool. If well used, television is as effective as a good teacher and if badly used is as ineffective as a bad teacher. "At last, both educational institutions and the community in general are beginning to awake to the fact that television is not just a trivial and passing phenomenon suitable only for entertainment, but is a medium which could be as significant for education as is print itself. Furthermore, the converging technologies of television and computing promise even more exciting developments in the future."[4]
- Educational methods must make use of the fact that we remember what we see, more than what we hear -- which is one of the most distinguishing features of television.
- The remarks on brainwaves and low involvement are not based on tested generalizations.
- Nor is it correct to make television the scapegoat for any upsurge of violence in a society. The link between television and violence has not been scientifically established.
- Television in fact humanizes distance education. The human face on the screen establishes a rapport and the mass medium in this way really delivers the message on an individual basis.
- Television generates a sense of belonging among the participants of distant education as it enables the sharing of the same program with thousands of others similarly motivated.
- Most of the criticism of television is in the context of the social situation in the US which need not necessarily happen elsewhere. Not in all countries, for example, do children spend more hours before a television than in school.

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[4] Greig, Andrew, Director, Television Service, University of Sydney, *Newsletters*, 1984-85.

- For the educationist, the debate is really not 'either-or'; in other words, the question is not whether television should be used or not as the sole purveyor of lessons; the question is how far television can be used with other media. Television cannot solve all problems.
- It is in the hands of the educationist to ensure that the format does not become more important than the context. Television can in fact take over some of the routine tasks and allow more time for profitable interaction with students when tutors meet them.

Perhaps the best 'advice' on the use of television came from a famous American broadcaster Edward R. Murrow. "This instrument can teach, it can illuminate, yes and it can even inspire. But it can only do so to the extent that humans are determined to use it to those ends; otherwise it is merely wires and lights in a box." Thus, the output depends on the deliberate goal adopted by an administration. The goals can be specified in two directions: to enhance the inputs for a life-long education of the people and to enrich the educational programs tailored specifically for the target audience.

The question whether television is necessary or not is in a way becoming academic as the spread of television technology has been remarkably rapid. The printing press did not make much progress for over three centuries after its invention and only in 1810 was a steam engine used for the first time to operate it. But television, thanks to the rapidly declining cost of electronics, has penetrated in a few years vast areas of the world especially with the advent of the Space Age. The hold of the visual media is too much to resist and people in even the most backward areas would like to have it, if possible.

It has been the experience of several countries that once television is allowed to take its own course, it is difficult to divert it to serve developmental goals. Commercial interests being too strong to let any diversion for education. And the medium will primarily serve an urban elite. "The mass media should be culture-led, not technology-driven. This implies that the shape of the communication system is derived from an intimate knowledge of the society it serves. It means that the content of the mass media, its appropriateness to cultural values and attitudes, must be the first consideration."[5] The utilization of television for education would add a cultural dimension to the mass medium.

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[5] Chanter, Alaine and Jackson, Keith, *The Role of Communication in Development*, Sydney, International Training Institute (ADAB), 1984.

TRENDS IN TECHNOLOGY

A. The Synchronous Satellite

When Arthur Clarke outlined a plan in 1945 to provide a satellite in what is now known as geosynchronous orbit, the idea was a pre-Space Age science fiction. A decade later, in 1955, Dr. John Pierce of the Bell Laboratory, US, published a detailed technical analysis of communication satellites in that orbit. He was the driving force behind the pioneering practical demonstration of the idea with the American, Echo and Telstar satellites. Essentially, a synchronous satellite envisaged by them had to circle the earth west to east (as the earth does) at 11,060 km/hr at a distance of about 36,000 km from the equator, which would enable the satellite to match the earth's rotation on its axis at 1,620 km/hr. Such a satellite is supposed to be in synchronous orbit from where it can 'view' one-third of the globe as a fixed star providing a reflecting mirror in the sky round-the-clock for the area under it. Initial attempts to launch such satellites did not result in this orbit. The first successful satellite to achieve this orbit was Syncom-2 in 1963. Later satellites of this type acted as repeater stations in the sky, transmitting microwave signals sent by ground stations. Three such satellites could 'cover' the whole globe except for the very high latitudes and the polar regions.

Telecommunication was the first application of space technology. Beginning with passive relay of voice and video signals by satellites, active repeaters offered 24-hour service. Rapid advances in electronics, satellite attitude control and deployable solar panels paved the way for regular international services followed by domestic system applications. The earth stations (consisting of the parabolic antenna and related electronics) used for sending and receiving signals need not track the synchronous satellites, whose stability is remarkable.

B. The Intelsat System

The international transoceanic telecommunication service has been provided since 1965 by the International Telecommunications Satellite Organization (INTELSAT), an intergovernmental organization with 109 members with 14 satellites in geosynchronous orbit over the equator. Over the last 20 years the number of international telephone circuits handled by satellites has grown 400 times and the demand has continued to grow at over 20 per cent a year, and what is most noteworthy is that the cost of an international telephone circuit has decreased 20-fold.

Intelsat I (called Early Bird) in 1965 provided for 240 telephone circuits or one television channel, while ten years later in 1975, Intelsat IV-A provided for 6,000 telephone circuits plus two television channels. The capacity was doubled in 1980 when Intelsat V handle 12,000 telephone circuits plus two television channels and four years later, in 1984, Intelsat V-A took the number of its telephone circuits to 14,000 plus two television channels. Intelsat VI will have 40,000 telephone circuits plus two television channels. The design lifetime has also increased from one-and-a-half to ten years.

Intelsat can give full-time, part-time and occasional services. Six standards have been set for earth stations of various sizes to handle heavy, medium and thin-route traffic. Intelsat offers over 100 different service possibilities including: telephony, voice plus data, telex facsimile, digital voice, audioconferencing, freeze-frame videoconferencing, full motion videoconferencing and various qualities of radio broadcasting including stereo, different levels of video in over 50 different optional modes; broadcast services, electronic printing and documentation distribution, thin-route telephony, data broadcasting and microterminals, etc.[6] Several of these services can find applications in educational television.

Many countries have leased some capacity from the Intelsat satellites to provide a limited domestic space link. Separate domestic satellite systems are in operation in Australia, Canada, India, Indonesia, Japan and Soviet Union, while regional systems are working in some Arab countries and in Europe. The People's Republic of China orbited its first synchronous satellite for communications in 1984. The Indonesian system also serves Malaysia, Philippines and Thailand. A noteworthy feature is that the availability of reliable and efficient space links has increased considerably the demand for telephone, telex, data and television services within countries. The steep growth in demand and the potentially rich revenues have fueled remarkable innovations in providing links from space, raising the hope that the user demands will be met by technology.

C. Recent Techniques

Most satellites in geostationary orbit receive and transmit signals in the C-band (6 GHz for uplink and 4 GHz for downlink). Satellites using this band have to be parked 3° apart and there are efforts to reduce this distance by sending narrower and stronger beams. It has been found that the effective solution is to use higher frequencies which cannot only make the beam narrower but pack more signals into a bandwidth. The major difficulty in this is that higher frequencies can be disrupted by rain or snow, but the problem is mitigated by increasing the power of the beam and by sensitive receiving equipment. Presently, the higher frequencies used are in the so-called Ku-band, at 11-14 GHz which has twice the frequency of C-band. Even this may soon get crowded. So the Japanese and Europeans are trying the Ku-band in 20-30 GHz (which is twice the Ku-band frequency).

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[6] Colino, R.R., "Intelsat's Twentieth Anniversary: Two Decades of Innovation in Global Communications," *Telecommunication Journal*, Vol. 52, 1985.

The frequencies already in operation are reused. One method is spatial separation of the beams directed at different geographical areas so that the same band can carry different messages to the areas concerned. Or beams to adjacent areas can be in different frequencies which can be repeated many times over. There can also be a technical way out; the polarization of the waves can be changed so that they do not interfere with each other. It is now common to use spot beams to serve particular areas with strong signals instead of the wide beam of the initial days which covers almost one-third of the globe with weak signals. The spot beams become quite useful to serve different countries (of small size) in a region; or in a domestic system to serve particular areas. Today's satellites are able to direct precisely their signals to small, inexpensive ground stations.

Communication satellites in the early 1970s carried a typical payload of 12 transponders which receive the signal from the ground, amplify it and retransmit it to a different point. One transponder can carry 1,000 telephone channels, or one color television channel, or 6,000 data links or a combination of data and phone channels. There are plans to increase the number of transponders to over 60 in each satellite. But there is a limit set by various factors and it is therefore necessary to increase the capacity of available transponders. One way of doing so is to use the higher frequency. The other way is by using digital form of transmission.

The digital method reduces all information – audio, video, data, etc. – to a binary code of 'one' or 'zero' which constitutes a binary digit or bit (an eight-bit word typically makes one byte). It has been found that voice communication requires 64,000 bits to be transmitted each second. Later research has discovered that good voice quality can be had at half this bit rate (32,000 bits/sec) or even at 16,000 bits/sec. Color television (US system) needs about 90 million bits/sec. Data between computers need a lower rate of 9,600 bits/sec. A higher bit rate demands more power and sophisticated electronics. But digital transmission can use the bandwidth most efficiently, with the least noise and interference.

The combined digital information of voice, television, etc. sent to the satellite with address codes is separated at the ground stations.

D. The Earth Segment

The earth segment has also undergone a change. Initially, the weak signals of the satellite had to be caught by a huge 30-m diameter parabolic antenna (called Standard-A by Intelsat) but later smaller antennas were developed as the power of the satellite signal increased. The smaller antennas vary in size, including those with a diameter of 4.5 m (Standard D-1) and 3.3 m (Standard E-1). For data transmission microterminals as small as 65 cm in size are in use. There is also a special Intelsat standard for domestic leases (Standard Z). In recent years applications for non-standard earth stations for domestic services have increased and so Intelsat decided to have some guidelines under this standard for compliance by the applicants.

There are two trends in the world in television broadcasting by satellites. One is the older system known as fixed-satellite service and the other is called the broadcasting satellite service. The fixed-satellite service can send the television signal indirectly from the originating point to an earth station (or stations) for relay to transmitting television stations; or directly to terrestrial broadcasting stations without any intermediate earth stations. The fixed-satellite operates on a point-to-point transmission basis either within a country or between countries. The broadcast satellite system, recently developed, brings the satellite signal straight to the receiver's home or office without any television station in between. With the coming of high-power satellites, it is possible for relatively simple receive-dishes with the appropriate code placed anywhere in the area of the beam to get the signals straight from a satellite. Indeed, the space system is undergoing a sort of complexity inversion, in which the space segment becomes more and more complex so that the ground segment gets comparatively simpler to operate.

One of the most prominent developments in this field is the shrinking diameter of the antenna-dish on the ground, ranging from one meter to 30 cm which can be aesthetically and easily placed in the consumers' premises. Moreover, the cost is decreasing and what with the enormous entertainment market potentially available for the use of private dishes, the unit cost is bound to go down further. It is true that the frequencies used for the direct broadcast service (DBS) are prone to attenuation by rain but with further research on increasing their power levels, acceptable levels of reception should be common. Receiver noise, for example, can be greatly reduced with the introduction of gallium arsenide semiconductor devices, and satellite antennas are becoming increasingly efficient.

The World Administrative Radio Conference (WARC-77) of the International Telecommunication Union (ITU) specified the power level standards for direct television broadcasts from satellites based on the data then available on receiver technology. Accordingly, individual reception through 90 cm dishes was allowed. But the technological advances have gone ahead so fast that today the diameter of the dish has been halved thereby decreasing the cost. As a result, the trade-off between the power of the satellite and sensitivity of the domestic receivers has again assumed importance. Some experts advocate low-power satellites pointing out the spread of cable television which can distribute television programs obtained by a few powerful ground stations. This view is not fully accepted by others who point out that even in industrially advanced countries the spread of cable television has been rather slow and is not likely to cover a large proportion of the population. Hence it is argued that cable television cannot really replace direct broadcast service. Rather, it is suggested that high-power satellites which may now need less power for television broadcast than before can carry more channels thereby reducing the cost per channel and giving the full benefit of the declining receiver cost to the consumer. Moreover, high-power satellites are necessary to beam television programs to a wide area serving many countries which may allow common programs.

E. Direct Broadcasting Satellites

Realizing the potential of DBS, ITU has been engaged in evolving an acceptable plan for its use. In 1977, an ITU plan assigned frequencies 11.7-12.2 GHz for Regions 1 and 3 (Europe, Asia and Australia) for DBS from various positions in the geostationary orbit. In 1983, the plan was made applicable to the Americas (Region 2). In that year, Intelsat announced availability of capacity in its satellites for small-dish earth terminals and the US started the first direct broadcast, leasing capacity from the low-power Canadian satellite, ANIK-C2. Japan has recently put into operation a direct broadcasting satellite. Canada and some European countries are also planning such satellites.

Even if technology offers DBS, there are several constraints in using it widely. First, its cost at present is more than the other system using the fixed-satellite service. But if there is anyone feature that is unique in this business, it is the downward trend in the cost of the electronics used in the service. Second, there is concern that DBS will accentuate the so-called cultural domination by flooding poor countries with "unwanted" programs, which would call for scrambling devices to limit the access. It is true that enterprising firms or people can pull a foreign signal and feed it to a local cable system. But, this needs the consent of the country concerned. Third, countries which are unwilling to restrict DBS openly, may effectively do so by demanding difficult technical standards, by making cable distribution cheaper and/or by filtering the inflow through national control points.

DBS is truly a bull in a china shop. It strikes at several established notions of mass communication which is mostly influenced, if not regulated, by governments. But the hardest hit will be the telecom authorities who derive good revenues from long-haul lines that connect the earth stations with the television studios, as such lines will be rendered redundant by the DBS terminals that can be located right on the roof of the television studio or home or business center. Moreover, the use of digital techniques will make the small-dish highly cost-effective as voice, data and video can be sent as an integrated signal economically. No doubt DBS application will first take place in sectors where money is, but the spin-off is bound to spread to the educational field. Those who doubt it would do well to recall the success, despite the pessimistic forecasts, in using DBS in India way back in 1975, when ATS-6 was used for SITE to provide community television in villages. The point is that DBS technology can be suitably introduced for national television distribution and its use can be regulated.

It would be useful to have a brief look at the law relating to satellite broadcasting. The concern is about television as the radio signals carried alongside the television signals would not seem to be the target of special attention except those technical radio regulations laid down by ITU. Since 1967 there has been a debate between those who argue for free flow of information without the interference of governments and those who desire to limit the broadcasts to national territory unless prior consent has been taken from the recipient country. The debate was resolved in 1982, although not unanimously, when the UN General Assembly passed a resolution by an overwhelming majority (with US, Japan and Western Europe opposing it) in favor of prior consent, where broadcasts are deliberately aimed at the overseas audience. Though it is still argued that the General Assembly's resolution cannot have the same legal force as that of a Convention, it is conceded that non-national DBS signals may not be directed at a country without its consent. Incidentally, the radio signal carried along with the television would not seem to be subject to the same prior consent requirement. Under ITU regulations (1977) each country in Regions 1 and 3 has been allocated up to five channels for essentially national coverage but a country can pool its channels with others or agree to accept a foreign television program directed to it deliberately. These regulations and the prior consent Resolution of the United Nations should offset the concern of developing countries about preserving their cultural values and communication policies.

F. Providing the Missing Link

Advances in satellite-related telecommunications have been fairly rapid; what is more, they have been adopted readily. The spin-off from this need not be confined to the developed countries. There has been growing realization for a better deal to developing countries in terms of basic as well as improved telecommunications. It has been pointed out that some 90 per cent of the world's telephones and about the same proportion of television receivers can be found in the countries that claim just 15 per cent of the world's population. Economic studies made by ITU have shown that the availability of reliable communications in remote and rural areas of the world are an extremely cost-effective investment with the benefits outweighing the costs by a 100-to-1 margin. The Maitland Report[7] points out that:

> ". . . in most developing countries the telecommunications system is not adequate even to sustain essential services. In many areas there is no system at all."

The Report emphasizes:

> "The economic and social benefits an efficient telecommunications systems confers on a community or a nation can be clearly perceived. The system can also be used as a channel for education for disseminating information, encouraging self-reliance, strengthening the social fabric and sense of national identity and contributing to political stability."

The concern for developing countries, combined with enlightened self-interest, is bound to improve the situation. Already, it is considered necessary that the increased flexibility of high-powered, multipurpose satellite designs will have to be adopted equally well to demands for radio and television broadcast services, and that satellites using digital techniques should link decentralized and widely dispersed networks in rural and remote areas. Intelsat, for example, has started a plan to provide a low-density telephony service on a global basis. The objective is to set up basic, minimum communications in rural and remote areas presently served poorly. This service will be most appropriate to a large number of small user communities dispersed over a vast geographical region, each generating only a small amount of traffic as in the South and Southwest Pacific or in some parts of Southeast Asia. Small low-cost earth stations (10 m and 4.5 m) with simple access and signalling can operate in different network configurations to suit the traffic demand. Some of the smaller stations can be run on solar battery power. Leasing of even a quarter transponder (for 80-voice circuits) was considered feasible. And this provision, it was pointed out, need not await the introduction of further high-powered satellites.

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[7] "The Missing Link," the Report of the Independent Commission for Worldwide Telecommunications Development Chairman, Sir Donald Maitland, ITU, 1985.

The technology for carrying out additional telephone circuits from the same satellite has been quite advanced through a system called Time Division Multiple Access (TDMA). In this system, the digital format of information is sent in separate bursts of data and each burst is allocated its own slot on one frequency. At present, calls are separated from each other by using different frequencies. In TDMA, transmission from different earth stations are separated in time rather than being done on different frequencies. The separation of the different signals is now done by different earth stations. A new technique is under development to process the signal on board the satellite itself and send separate signals to the concerned earth station. Another technique, called Digital Speech Interpolation (DSI), efficiently exploits the fact that each person in a telephone talk is in fact silent for about 60 per cent of the time and so the channel is activated only when the person talks. Also, digitally processed television color picture and sound can be transmitted using a fraction of the transmission capacity facilitating low-cost videoconferencing. Small dish antennas to work with satellites have been developed using digital transmission to give high-quality, efficient and flexible communications, useful at present for business firms. Looming in the horizon is high-definition television (with 1,125 lines as against 525 at present in one system) which is being developed by Japan.

The mission life of a satellite, at present seven years (mainly because of the limited amount of fuel that can be carried for correcting the natural drifts in orbit), is sought to be increased to ten years, with six-fold frequency re-use, providing 40,000 telephone circuits plus four television channels. In another development, five high-power direct broadcast channels will be possible from a communication platform planned for use in Europe over a ten-year operating period.

While these technological improvements will no doubt be guided by the market demand in the advanced countries, it would not be a futile hope to envisage their gradual impact on other regions of the world. This process depends on availability of resources needed for the transfer of technology, specific plans by would-be beneficiaries and assurances of continued and equitable service. The US Shuttle tragedy and the recent failure of some of the satellite-bearing rockets (Titan, Delta and the European Ariane) have created an air of uncertainty in space business. However, the efforts to revive the launch capability will not be given up, as the stakes are too high, given the markets, the technology and the competition. A buyer's market is bound to emerge soon at the end of the present temporary lull. A new compact satellite has already been developed in the US for customers who need little capacity and it is claimed that it can be launched for one-third the cost of a standard communications satellite.[8] Other countries will also enter this business. Japan has recently launched (August 1986) its biggest rocket, H-1, using liquid oxygen-liquid hydrogen propulsion. Japan hopes to develop H-2 soon and win contracts for launching satellites of other countries. The People's Republic of China has already agreed to launch American and other satellites in the next two years using its newly developed rocket.

G. The Geostationary Orbit

Given a reasonable prospect of placing the satellites into orbit, a more fundamental question remains viz. the use of the geo-stationary orbit. As educational broadcasts and transmission depend on these satellites, recent developments regarding this orbit may be noted.

The orbital slots for these satellites are now at 3° intervals, resulting in 120 positions round the earth's equatorial circumference. However, in view of the geographical location of the land mass, certain arcs in the orbit are more crowded than others. For example, the Indian Ocean arc is more crowded than some of the other arcs. There are increasing demands by both developed and developing countries for the slots, which have been occupied on a first-come first-served basis. The developing countries felt that this principle would deny them the opportunity to use the orbit when they eventually want to do so. There are already over 140 satellites in this orbit (though only a handful have been launched by or for developing countries) and some 160 more are in the offing. However, some developed countries felt that the slots should not be frozen for future use as that would prevent its efficient utilization by improved techniques.

The International Telecommunication Union (ITU) convened a conference in 1985 (WARC ORB-1) to examine the issues in an effort to reconcile the principle of equity of access with maximizing efficiency and economy of use of the orbit. After considerable technical reviews and debate, the Conference has recommended an allotment plan for certain bands (including in the highly used C-band) and that each administration should be permitted to satisfy requirements for national services from at least one orbital position within a predetermined arc using predetermined bands. The Plan, the Conference added, should be limited to national systems providing domestic services. However, provisions should be made "to enable administrations with adjacent territories to combine all or part of their allotments with a view to ensuring a sub-regional service." The issues will be further discussed in the light of technical studies and developments at a second conference regarding this orbit (WARC ORB-2) in 1988.

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[8] Announcement by Hughes Aircraft Company, 1985.

The technical studies will relate to the use of higher frequencies and improved antennas that would enlarge the access to popular places in the orbit. For example, if an earth station's antenna could produce a narrower microwave beam to a satellite, the beam would not spread so as to interfere with adjacent satellite and thereby it would be possible to reduce the distance between satellites from the present 2,200 km to less than 1,500 km. British Telecom International and British Telecom's research laboratories have jointly developed such an aerial.[9] Some of the higher frequencies may have problems such as attenuation by rain but techniques are being evolved to ensure their efficient use.

An underlying trend in all these deliberations is the increasing confidence of developing countries about their use of space technology. It is noteworthy that numerous developing countries have made advance registrations for slots in the geostationary orbit, even if they do not as yet have firm plans to have satellite services.

H. Satellite Radio

The quality and reach of educational radio broadcasts depend on the technical features of the radio systems. The frequency spectrum is shared for several uses and the allocations for radio are made by ITU for each country. An ITU Plan has allocated medium wave frequency plan for 1975–1989. The medium frequencies are good up to 150 km though they get attenuated quickly, especially in the night. It is subject to noise such as atmospheric disturbance, interference by foreign signals mostly from neighboring countries and limitations inherent in the layers of the radio mirror of the sky called the ionosphere. Short wave radio or high frequencies (HF) are subject to solar activity and ionospheric disturbances, though the propagation can reach far-away places from the transmitter. But there are optimum frequencies for each target area and crowding of various stations around them is quite common. The use of HF (short wave) by various countries is uncoordinated except that they are required to notify ITU of their intent.

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[9] *News Release* by British Telecom, London, 30 January 1984.

Low frequencies (LF) travel along the ground and can be used but ITU does not allow its use in tropical areas on grounds of unacceptable atmospheric noise. Moreover, any country changing to LF should face the problem of rendering the currently used receiver sets obsolete. On the other side of the spectrum is VHF (used for frequency modulated radio and for television sound) which has a short range (generally of 100 km) limited to the line-of-sight. In other words, the transmitting antenna should be directly 'seen' by the receiver. The mode of transmission (where the frequency of the radio carrier is varied instead of the amplitude) ensures noise-free broadcasts, unlike the medium wave frequencies which are amplitude modulated (i.e. the strength of their radio frequency carrier is varied in accordance with the information – speech or music). The use of FM does not involve ITU coordination but requires special radio receivers. Generally VHF antennas are located on high elevations so as to increase the coverage area.

Several countries find it difficult to provide satisfactory radio service since the coverage area decreases as a result of strong signals of neighboring countries. For networking, the radio authorities depend on the telecommunication coaxial or microwave links, besides shortwave transmission. Still, it is difficult to provide a satisfactory service to all parts of the country. In some areas there may not be any circuits at all to be leased for radio.

An operational geostationary satellite offers a cost-effective means of providing a networking capability both on a national and regional basis. A national channel is possible by uplinking the transmission to the satellite which will re-broadcast the signal to all stations with suitable receivers all over the country. On a regional level, an uplink in one region can send the signal to be received by all stations in that region (often one language area) for re-broadcast. This way, the unsatisfactory terrestrial links are avoided. It is also possible to combine this facility with that for television without affecting the quality of television signals.

India's Insat-1B, for example, has such a provision. The satellite is used for radio networking. It has been found technically feasible to utilize each one of the two high-power transponders on Insat (in S-band at 2.5 GHz) meant for television to accept and transmit five low-power narrow-band carriers of sound programs. The radio programs can be accessed from the satellite by receive-only terminals (3 m antennas) at the radio stations. The signal is then re-broadcast. The uplink can also be provided by a suitably equipped mobile earth station. Networking will facilitate clear reception of programs – a feature which is very necessary for retention of student interest in broadcasts.

While there is no doubt that the quality of sound broadcast transmitters will be the highest possible under a networking arrangement via a satellite, the whole process of creating a network will take time and call for a good maintenance system. And several transmitters will still be needed to ensure total coverage (e.g. a country of the size of the UK would need 100 transmitters of various power levels to provide full coverage). In sharp contrast, direct broadcasts to radio sets (including portables) could give instant total coverage with zero ground maintenance (except for the uplink system) and provide as many as 20 channels, which will give a boost to educational radio programs. The technology for this system can be compatible with the terrestial FM broadcasting so that the existing receivers could be used with some additional equipment (an antenna and a converter to adapt the satellite signal to the conventional sets). Mass-produced, such receiver sets can have the benefit of the economies of scale. Moreover, as FM broadcasting is still in its early stages of growth in many developing countries, it would be possible to introduce technical improvements in the use of FM signals. The availability of good and relevant programs will boost the sale of the sets, as at present only a small percentage of the population has access to radio in many developing countries and school broadcasts are not widely made use of.

A geostationary satellite for sound broadcasting capability would require more and more power as the area of receivers moves north and south of latitude 40° and the system is therefore of particular relevance to the developing countries in the middle latitudes.[10] The mass and power of the antenna and repeater of the typical communication satellites today cannot provide more than a few broadcasting channels and so the space system does not become cost-effective compared with terrestial networking. The most effective way is to introduce the service with larger satellites now being built for direct television broadcasting and/or add the service to the multipurpose satellites (such as Arabsat and Insat). It has been calculated that to serve an area of 1,000 km diameter, a broadcasting satellite should have a transmitting power in the range of 100-200 kw and an antenna of about 9 m which is rather long.

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[10] Chaplin, J., Fromm, H.H., and Rosetti, C., "Broadcasting of Radio Programmes by Satellite to Portable/Vehicle Receivers," *European Space Agency Bulletin*, No. 37, 1984.

However, the use of a 9 m antenna had already been successfully demonstrated on the Application Technology Satellite (ATS-6). A cost-effective system requiring reduced satellite antenna size (3.11 m and 7 m) to serve limited areas without including automobile reception has also been technically outlined.[11] The provision of 20 channels would call for a new approach in sharing them with other countries in the Region, if one country alone cannot use them all. The immediate need, however, is to ensure the allotment of a frequency for satellite sound broadcasting. Technically, frequencies around 1 GHz are found ideal. ITU is yet to make an allotment. Meanwhile, WARC-79 has acknowledged that a broadcasting service in the 0.5-2 GHz would be possible but recommended further studies particularly to ensure that terrestial links are not affected. Following the plea of the developing countries, a special mention was made of the 1429-1525 MHz band for the service but further experiments were considered necessary especially in view of a neighboring band reserved for radio astronomy. WARC-ORB 85, which was asked to define the need for an allocation for the sound broadcasting service in the 0.5-2 GHz band has recommended further studies on the quality of service, frequency of operations, modulation, bandwidth needed and multiple-use satellites. The second session of WARC-ORB to be held in 1988 has been asked to take appropriate decisions in the matter. Since a decision requires a majority vote in the concerned ITU body, and as the higher latitude countries are not interested, it is essential for the developing countries to ensure that proper frequency allotments are made for this service. And the need to maximize the use of educational radio programs in developing world provides a strong reason to get the desired frequencies for satellite sound broadcasting and look for appropriate satellite designs.

SPACE LINKS FOR EDUCATION

A. Introduction

The area of study in this Chapter is mostly concerned with experiments and ongoing plans of those countries which have significantly utilized satellite technology for education. An overview of the pioneering efforts is followed by a review of the world's most extensive experiment involving space communication conducted in India and a preview of the potential in Indonesia which has an ongoing domestic satellite system and in the South Pacific where the space connection for education is overdue and several preliminary efforts in this direction have been already made. This Study does not mean that the scope or claims of other countries in the Asia-Pacific region are less important. Indeed, notable projects in distance education involving radio and terrestrial television have been implemented by Bangladesh, Republic of Korea (Korean Educational Development Institute), Malaysia, Nepal, Pakistan, Philippines, Sri Lanka and Thailand (Sukhothai Thammathirat Open University).[12] Some countries such as Maldives, Nepal, Philippines and Pakistan can, in view of their geographical nature, explore the scope for providing satellite links for distance education projects. Several of the considerations that are discussed in this Chapter in regard to India, Indonesia and the South Pacific relate essentially to some of the basic principles and problems of satellite technology (though some problems may be country-specific) and will be of relevance in considering the scope for space links elsewhere in the region.

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[11] Aurora, O.P. and Narayanan, K., "Sound Broadcasting Satellite System for a National Coverage in Developing Countries," *Telecommunication Journal*, Vol. 51, No. 12, 1984.

B. An Overview

The world's first domestic satellite system based on geostationary orbit was inaugurated in Canada in 1972, with the launch of Anik-1. Canada is among the early pioneers in the educational use of satellites on a regular basis. One of the initial experiments in this field was made by the Distance Education Planning Group of the Ministry of Education in British Columbia.[13] With the launch of the second generation of satellites, Anik-B, several educational institutions began offering courses to undergraduates via satellite. It is generally regarded that this was the first time in the world that such a scheme was tried. Anik-B used the higher frequencies than the earlier ones for transmission (14-12 GHz). The satellite medium was a major component in the Knowledge Network set up by British Columbia. The Educational Research Institute of British Columbia, Vancouver, has been actively involved in utilizing satellite technology for education. Other Canadian provinces also started space-related programs including telemedicine (continuing medical education) and information for remote communities. The third generation satellite, Anik-C3 (launched in 1982) has twice the capacity of Anik-1 and can deliver high-quality television pictures to roof-top antennas using high frequencies that do not interfere with the terrestrial microwave frequencies.

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[12] *Bulletin of the UNESCO Regional Office for Education in Asia and the Pacific* on Distance Education in Asia and the Pacific, No. 26, 1985.

[13] *Learning at a Distance and the New Technology*, Publication by the Educational Research Institute of British Columbia, Canada, 1982.

The United States, which pioneered the technique of using the synchronous orbit, followed suit and began experiments in educational television. The Appalachian experiment in 1973 investigated the effect of the satellite system in educational programs with one-way video and two-way audio. Local committees determined programming which was made available at both undergraduate and graduate levels. In another project in Alaska, the program included English teaching, health education for children and teacher training. In yet another scheme (1974-75), the Federation of Rocky Mountain States had education courses for junior rural high school students with ATS-6 satellite. With the operation of domestic communication satellites on a routine basis, educators in the US have taken advantage of the facility to introduce audioconferencing and teleconferencing in instructional television.

Of late, satellite programs have been in operation for special target audiences including doctors, nurses and engineers. For example, the Association for Media-based Continuing Education for Engineers has planned a dedicated television network to broadcast non-credit short courses on computers, management skills and topics of interest to high-tech companies. Programs from the participating universities will be broadcast from the earth station at the Georgia Institute of Technology. The organizations involved pay for the services. This direct broadcast system to widely dispersed but closely related community of doctors, engineers and technical managers helps the participants keep in touch with the latest trends in their disciplines and promote common bonds.

An early international education project was done by Brazil in 1972-76, when that country made use of the American satellite, ATS-3, and set up an experimental link with Stanford University. The link was used to transmit slow-scan images, documents and televised classrooms, and for providing medical consultation and training.

ATS-6 was used in 1978 by the University of West Indies which participated in a two-month video demonstration project on medicine, science and social work in an off-campus program. The US Agency for International Development (USAID) had given assistance for an audioconferencing project in the Caribbean for people in various islands. In October 1983, the University began a distance teaching experiment by leasing a telephone link with a communication satellite of NASA for transmitting pictures and sound. Eight degree courses and others for adult education and training are taught this way. The University's centers are in Antigua, Barbados, Dominica, Jamaica, St. Lucia and Trinidad.

It is interesting to note the problems in the experiment. Students found it difficult to get support material such as books and in some cases could not follow the tutors' way of speaking. It was reported that there were also occasional problems of maintenance of the hardware in the earth stations. The space link is a unique method of solving the problems of shortage of skilled teachers, and of insufficient resources for setting up conventional teaching institutions for small groups.

The Caribbean project was broadly reflected in the Pacific, when Pan Pacific Education and Communications Experiments by Satellite (PEACESAT) was initiated in 1971. It consisted of two-way ground communications terminals used by regional educational institutions in American Samoa, Australia, Fiji, Gilbert Islands, Hawaii, Hebrides, New Zealand, Papua New Guinea, Tonga and Western Samoa. Only voice communication was provided to facilitate the sharing of resources through satellite technology. ATS-1 was subsequently used by the University of South Pacific.

A satellite system for Australia was started in 1985 with Aussat-1 and 2 of the first generation of satellites. The downlink has two national beams and four spot beams covering different parts of the country. Aussat-3 will in addition have a beam with uplink and downlink capacity available for the Southwest Pacific region. It is possible to switch transponders on board to different beams, national or spot, by ground commands to suit the customer requirements. The frequencies used are around 14-12 GHz so as to be free of any interference with the microwave links on the ground. Typical applications envisaged include a cost-effective and flexible means of establishing interactive distance education. Among the trial schemes is the Queensland Government's satellite network 'Q-NET' which involves broadcast television to about 30 centers. The project will look at whether satellite communication is a cost-effective means of providing postgraduate vocational training and continuing medical education to general practitioners in Queensland. Questions from the centers are relayed to the presenter in Brisbane via the telephone network. A two-year pilot phase of the project seeks to provide an in-service course to pre-school to year three teachers to help them develop children's reading and writing abilities. There are different types of earth stations: interactive, which can receive television broadcasts and data and voice transmissions as well as transmit data and voice; and television receive only TVRO which can only get television, data and voice but cannot transmit signals to the satellite. This is the first telecourse development in Australia.

An imaginative distance education program in Australia is run by the Darling Downs Institute of Advanced Education, Toowoomba. Phone and radio links are established with students between Toowoomba and far-away centers to supplement educational course materials. The experts are of the view that the interactive mode clearly enhances the involvement of the student as well as the teacher. The Institute has its own audiocassette copying facility besides studios for audiovisual productions. It is proposed to conduct telephone tutorials through satellite to link the central campus at Toowoomba to 15 other locations. Data transmission will be used to transfer student records of computer-managed tests from different places to the Toowoomba Campus. Combination of video and two-way voice will be introduced. Already the Institute offers a wide variety of courses leading to diplomas and degrees in areas such as electrical, civil and mechanical engineering, accounting, education and educational administration.

An innovative effort by the Toowoomba Institute is the computer-managed learning in tertiary education. They found that external students can be provided microcomputers as an integral part of teaching. It was possible to identify and resolve problems of students early in the learning process and the feedback could be individual and immediate. Moreover, computers were able to provide an interactive learning experience in distance education.

Britain and the People's Republic of China provide unique examples of promoting educational television, though used in the terrestrial mode. The Open University (OU) in Britain, often described as the most radical and successful innovation in many years, was established in 1971. Its enrollment is reportedly 250,000 students working for degrees. It is estimated that about 100,000 students watch lectures on BBC television early in the morning or late at night. The OU provides perhaps the best means of enabling people to adapt to changing technologies. It is noteworthy that OU's degrees are widely respected. The high standard of production of the television programs ensures effective and useful absorption of the subject matter. The medium has played a useful role in making education acceptable. The increasing skills of television production have spilled over to this region as well. The television input is strongly supported by as many as 260 study centers staffed by part-time tutors. Perhaps, videocassettes may have to play an increasing role as part of the supporting material in view of the mounting pressure on the broadcast time exerted by commercial and other interests. The coming of satellite broadcasting in Europe, facilitating direct broadcasting, will no doubt increase the choice of fare to the average viewer but its effects on the slots already available for educational television have to be watched.

Britain's "College of the Air" on Channel 4, due to be opened next year (September 1987) is hailed as a historic breakthrough in the country's broadcasting, which "will bring training and vocational education out of the night school age". For the first time, both BBC and ITV – the public and commercial broadcasting organizations – will work together offering a chance to all television companies in producing and transmitting college programs designed to impart technical and vocational skills to the over-16s. There will be, according to the authorities, no dearth of funds, and this is good news. Most of the financing will come from the industry. BBC, which cannot accept sponsorship broadcasts, will use the money to produce support materials on the pattern of its assistance to the Open University. Sponsorship in the commercial companies is not expected to be tied to individual programs. The Government has set up a limited company to validate the television and radio courses. The details of operation of the College of the Air are being worked out including the need to involve national summer schools and tutors at the local level.

While the new venture is welcome, there are dubious signals from space. Britain's first cable and satellite children's channel has made good headway. A program described as "pure entertainment" is prepared in London and transmitted to Intelsat and Eutelsat to about 18 television channels and is not restricted by special codes. So anyone with a suitable dish can see it and it is also sent through cable. Some educationists have expressed concern about the round-the-clock availability of such programs.

The People's Republic of China (PRC) has accorded an important role to distance education through television, which is for the time being land-based. It would only be a matter of time before satellites are used for education in China, given its fast-developing space capability. PRC has already stated that "in order to have a nationwide television transmission system and to raise the cultural and scientific levels of the broad masses by satellite television education, it is imperative to develop a broadcasting satellite". To this end it is carrying on research work, PRC has declared its intention to place a domestic communication and broadcast satellite in the geostationary orbit "after the Experimental Communications Satellites are launched".[14] The Chinese planners have not hesitated to take advantage of Western technology. British Aerospace announced in 1984 that it was working with a French aerospace contractor (MATRA), on the design of a direct broadcast satellite for PRC incorporating the requirements given to them by PRC.[15] In April 1984, China placed its first experimental telecommunications satellite into geostationary orbit. Since conventional universities cannot satisfy the growing demand for scientists, engineers and technicians, the Government has decided, among others, to expand the Television University system (TVU). The TVU system, started in the early 1960s, was halted during the Cultural Revolution but resumed in 1979. The TVU enrollment is expected to triple to 1,300,000 students by 1990. The Central Radio and Television University and 28 provincial television universities have been set up; the latter operate over 500 branch schools (with audiovisual centers) and work stations which supervise television classes. In addition to broadcasts, audiocassettes and booklets are distributed. China plans to double its enrollment in higher-level education by 1990, through rapid expansion of its polytechnics and the Television University. A substantial increase in the skilled labor force is envisaged as a result of TVU enrollment, as the Government had decided to enroll an increasing percentage of recent middle-school 'graduates'.

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[14] National Paper by PRC presented at the Second UN Conference on the Exploration and Peaceful Uses of Outer Space, 1982.

[15] *News Release* by British Aerospace, 6 September 1984.

C. The Indian Experience

1. *Lessons From SITE*

An opportunity to try satellite television for development and education in India was available when the US offered to spare its Application Technology Satellite (ATS-6) for one year in 1975. ATS-6 was accordingly used in what is familiarly known as the Satellite Instructional Television Experiment (SITE) in India. Especially designed programs were telecast to 2,330 villages spread over six states in the country viz. Andhra Pradesh, Bihar, Karnataka, Madhya Pradesh, Orissa and Rajasthan. Everyday one-and-a-half hours of programs were transmitted in the morning for children and two-and-a-half hours in the evening were assigned to programs for adults. The direct reception sets with 3-meter "chicken mesh" antennas and related equipment, as well as transmitters – all made indigenously worked satisfactorily. About 84 per cent of the sets were operational on average and not a single transmission was missed. SITE demonstrated that the equipment for satellite communication and broadcasting can be designed and built in the country and a maintenance system suitable for rural areas can be worked efficiently.

The educational content of the telecasts was not curriculum-oriented. For example, special capsules on science education were made in Hindi which was dubbed in Oriya, Kannada and Telegu – the languages used in the states selected for SITE. Each capsule was about 22½ minutes long and the program was the result of intensive workshops involving educationists, producers and scientists. Generally the take-off point was from the village well, around which scientific ideas were explained in a simple manner.

A teacher training program was conducted by the National Council of Educational Research and Training. It involved nearly 24,000 village teachers (ten at each center) who were exposed to a multimedia package including television, radio and printed matter.

Various surveys conducted revealed that in SITE villages:

- The television programs became quite popular.
- School attendance improved; even young children not in school were brought by the older ones.
- Children's vocabulary increased.
- Cognitive, attitudinal and behavioral changes were observed.
- The teacher in the sky was often better than the one on the ground.
- Children who watched television sought more information from different sources (books, etc.) than those who did not.

The surveys on the impact on adults were equally revealing:

- Illiterate women gained some new knowledge.
- Information programs (e.g. "how to" and "what to do" types) were preferred to entertainment.
- Increased awareness of events in the state and the country was noted.
- Illiteracy was no barrier to the gain of new knowledge.
- Overall gain in health and hygiene was noticed.
- Several improved practices in animal husbandry and farming were understood.

Some drawbacks were also noted:

- Social customs prevented women in some areas and backward sections in others from watching the programs together with the rest of the village community.
- Some of the messages could have been attuned to local conditions.
- In some programs, the language used in the program was a bit unfamiliar to the audience.

It was noted that the preparation of programs for rural audience would demand considerably longer time and greater effort than the assembly of urban programs. Pre-testing of rural programs is a must to ensure that the message is understood and applicable.

The hardware performance was the result of careful management and planning of the experiment. Each of the six clusters of 400 direct reception sets in different states had a separate maintenance center and the down-time of most of the sets could be reduced to the minimum since repair often involved only replacement of some modules. The emphasis on timely feedback and maintenance paid dividends.

It was, however, noted that SITE was a one-time project and the resources mobilized and the dedication and motivation to ensure the success of a novel experiment could not be had on a regular basis for 'normal' programs. This underlines the need for devising suitable ways of sustaining the drive and enthusiasm for such a program even after the novelty wears off. In sum, SITE showed a workable methodology for setting up a network for satellite communication for education and development.

2. *INSAT and Education*

India has an operational domestic satellite system being used for telecommunication, television and metereological services. The television service includes regular daily transmission for education in two modes viz. direct and indirect. Direct television programs are broadcast straight to small antenna dishes and special television receivers in remote villages in six states. Television signals are also distributed indirectly through transmitters which rebroadcast the program to conventional receivers.

Though the Indian Space Research Organization had the capacity to make experimental or semi-operational satellites and India had become the seventh nation to acquire a satellite launching capacity, it was decided to purchase and launch a satellite from abroad for regular use. However, a unique design was ordered combining all the functions of telecommunication, television and weather monitoring. The three-in-one satellite, Insat-1A, was launched in April 1982 but soon developed problems and after about four months, suddenly disappeared following a malfunction which was later estimated to be a one-in-a-million failure. The design itself was found valid and with some improvements, Insat-1B was launched in August 1983, which is expected to serve the country's needs till the end of 1989. Insat-1C, due in September 1986, could not be launched followed the US Shuttle disaster. It will now be launched by the European Space Agency's Ariane rocket early in 1988. The next generation, Insat II is expected to be launched by 1991-92. It will be an indigenous satellite.

Each Insat is designed to provide 4,000–5,000 two-way long-distance telephony circuits (4,300 in combination with other uses). It has 12 transponders (in the C-band) which can be used for catering to both heavy and thin route traffic. Each transponder can transmit two television channels, if need be, to earth stations. For transmitting television in the direct reception mode, Insat has two separate high-power transponders (in the S-band). Each is capable of sending one television broadcast for national coverage to specially made community viewing sets (up to 8,000 were planned).[16] The Master Control facility, managed by Indian engineers, is at Hassan, in Karnataka.

The operational domestic satellite system in India has led to a massive expansion of television services in the country. The number of television transmitters has reached 181 and more are likely. The Seventh Plan also envisages an increase in the coverage of population from 70 to 80 per cent.

At the same time, the country's educational policy is under review. The Government's new national policy on education has been announced and a task force set up to examine it. The Planning Commission has pointed out that the human resource development approach calls for a breakaway from the conventional approaches to education and training and that the mutually reinforcing roles of education, mass media and communication technology need to be taken into account.

It is expected that once the educational goals are clearly defined, the role of media including that of satellite television would also be refined. For the moment, a big effort is under way to utilize the time slots given to education on satellite television. Insat ETV (Educational Television) is not curriculum-oriented. It is aimed at primary school children in the age group of 5-12 years in the six direct satellite broadcast service states of Andhra Pradesh, Bihar, Gujarat, Maharashtra, Orissa and Uttar Pradesh. At present, the direct broadcast receivers distributed in these states get the program in five languages, viz. Telugu, Oriya, Marathi, Gujarati and Hindi. The Hindi telecast is rebroadcast to conventional sets in all Hindi-speaking states. The telecasts in each language running for 45 minutes are made from 9 a.m. till 12:45 p.m., time-sharing the satellite on all working days except the vacation period. The production is shared by Doordarshan (TV) and the Central Institute of Educational Technology (CIET). In order to strengthen the production facilities, one ETV Studio Facility in New Delhi under CIET/NCERT and one each in the six service states have been planned.

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[16] *INSAT – The Indian National Satellite System*, Government of India, Insat Coordination Committee, 1984.

General enrichment programs are also made by the University Grants Commission. (There are 150 universities with 5,000 colleges in the country.) The program is in English and lasts an hour from 12:45 p.m. to 1:45 p.m. and is repeated at 4 p.m. Started in 1984, the program is aimed at undergraduates and educated public. Till indigenous production facilities are set up, selected foreign films are accepted. The national production facility envisaged consists of four educational media research centers located in different parts of the country. The EMRCs will have full-fledged studio and staff for production under a producer in the grade of a professor, while the other centers have limited studio facilities mainly for purposes of orienting the faculty in using audiovisual aids. All those interested in contributing to the slot are welcome to do so, subject to the broad control of UGC. Teacher training programs are also being planned. It would be eventually necessary to use regional languages and increase the programs to serve different audiences. In view of the pressure on prime time television, it is considered desirable to have in the short-term a second channel, only or mainly for education and in the long-term, even a separate satellite.

Television support to formal education is on a limited basis. School television is broadcast in the terrestrial mode from only four cities viz. Delhi, Bombay, Madras and Srinagar for about eight hours a week in their respective languages. None of the correspondence courses has television support. The New Education Policy makes only general comments on the use of media: "Modern communication technologies have the potential to bypass several stages and sequences in the process of development encountered in earlier decades . . . modern educational technology must reach out to the most distant areas and the most deprived sections . . ." Referring to adult education, the Policy states: " . . . the mass media and educational institutions must commit themselves to mass literacy programs of diverse nature". The Planning Commission seems to be in favor of curbing expansion of facilities or establishment of new institutions and would, instead, prefer concentration on areas highlighted in the Seventh Plan viz. universalization of elementary education by 1990; eradication of quality in secondary and higher education and modernization of technical education.

It would be interesting to examine if any or all of these goals can be served by an imaginative use of satellite-based communication technology. In principle, a positive answer seems to be warranted, given the potential of the satellite medium to help pool scarce resources and serve a large audience in a cost-effective manner, with enriching inputs. However, in practice the utilization would depend on the specific goals and detailed strategies that would be hopefully outlined.

An encouraging first step in any plan to use satellite television on a major scale for education is in the decentralization of the seemingly monolithic television structure in the country. No longer do the low-power transmitters of television need to be only relaying stations for programs from the national capital of Delhi. While all-India relay is still possible and desirable, it would be used for programs of countrywide importance. The primary service which is based on the state capitals will operate in the respective state language, with an uplink facility so that it can interconnect all the other transmitters within its region through the satellite, thereby in a cost-effective manner. The increased "visibility" of the program, in terms of reach and clarity, will facilitate the planning of educational services oriented to serve the region. In addition, the third tier of the scheme viz. the local service telecasting programs of local interest can be similarly used for pre-primary and primary school programs.

In planning educational telecasts, several experts urge that care should be taken to reflect on the true spirit of the satellite viz. the indigenous nature and a non-urban bias without disregarding the urban poor. Otherwise, the Plan could well emerge as an urban-centered elite-oriented application of limited value.

In the post-Insat II period (1990-97), Indian planners envisage extensive applications of satellite-based technologies in communication and education. One possibility is the provision of a special service to widely dispersed specific groups such as doctors, engineers and technocrats who need periodic upgrading of their skills. Another would be to serve the people in the rural areas with an improved public facsimile for transmitting educational material.

3. Radio Networking

All India Radio (AIR) has a wide network in India (86 stations with 166 transmitters) and programs for schools are generated from 44 stations and relayed by another 30. The service is regional and uses the regional language. The regional stations' output is syllabus-specific (except for primary schools) and is not centrally produced. AIR at present devotes nearly 40 per cent of its broadcast time to spoken word, of which those for schools and universities account for about 15 per cent and about 10 per cent represents the educational "content" in other broadcasts.

The Seventh Plan objective is to provide two hours of programs everyday for the following: broadcasts for pre-primary, primary and secondary schools; adult education; support to correspondence courses; language lessons; teacher training. Added to this will be the demands likely to be made by the newly set up Indira Gandhi Open University. In addition, there will be a one-hour program everyday on the national channel being commissioned shortly. These will be in addition to science broadcasts and non-formal educational programs which are designed to specific audiences such as farmers, women, children and industrial workers.

While this is a commendable effort, several experts have of late pointed out that AIR is supporting too many programs and their full use is not ensured by the authorities concerned. The primary school broadcasts constitute as much as 50 per cent of the formal educational broadcasts of AIR. The New Education Policy (1986) states that all children who attain the age of about 11 years by 1990 would have had five years of schooling or its equivalent through the non-formal stream. But adequate listening sets for the primary schools have not been reportedly provided to benefit from the broadcasts. The situation calls for innovative measures when it is realized that 40 per cent of the children in 6-11 age group who are not in school, have to work almost full-time to support their families.

The secondary school broadcasts, planned with expert assistance, deal with only two subjects at the most for one standard in one term. But unfortunately, the schools do not seem to utilize even this fully. According to one report, the schools are unable to devote even an hour per week per standard. The concern on the part of the teachers is to complete the syllabus in time and the broadcasts, being not fully integrated with the subject taught, do not get appropriate attention.

Out of over 30 universities which offer correspondence courses, only four make use of radio. A survey by the Audience Research Unit of AIR points out that the utilization of these broadcasts is not satisfactory. There seems to be an urgent need to offer correspondence course on a highly selective basis if it is to be effective. If numerous subjects are offered, duplication occurs and there is no attempt to have a common schedule among universities in one state. The net result is that radio support to distance education becomes marginal. A subject gets just 3-10 broadcasts in a year. Efforts are being made to improve the utilization of the available support services while planning for the expansion, subject to resource allocation. As a result of a Constitutional Amendment in 1976, education is in the Concurrent List, which provides for the sharing of administrative and financial responsibility between the Union Government and the States. The Union Government would accept a larger responsibility to reinforce the national and integrative character of education, to maintain quality and standards and to study and monitor the educational requirements of the country as a whole in regard to manpower for development.[17]

An opportunity to streamline educational broadcasts has come with the advent of Insat as satellite radio networking is being introduced in the country. The network will consist of uplinks to the satellite from Delhi, Bombay, Madras and Calcutta (and from a mobile station) and 94 receive-only terminals, besides 12 uplink facilities from state capitals. This will enable AIR to implement its three-tier system of broadcasting national, regional and local channels. A national channel (the satellite has the capacity for five channels) can be used for educational broadcasts of countrywide application. A regional uplink would enable the programs originating from its location in a state capital to be relayed by the satellite to all the transmitters of that region which can in turn broadcast them. In other words, the transmitters in a region will no longer be dependent on ground links or the subject to short-wave limitations and therefore the reception will be clear. The addition of the radio uplink can be done with a small increase in investment where a television uplink has already been provided. Since educational broadcasts in the states are in the regional languages, they can make use of the uplink facilities in the state capitals so that they can be properly heard by their audience. A redeployment of course production work among the regional and local stations may become necessary. When more and more local stations use the FM mode of transmission, the clarity of the educational broadcasts will be further improved.

D. The Potential in Indonesia

1. The Palapa System

Indonesia is the first Asian country to have an operational domestic satellite. Palapa-A1, the first of a series of geosynchronous satellites, was launched in 1976. Since then, Indonesia has utilized the satellite communications system for telephone, telex, telegraph, radio and television on varying scales.

With over 13,500 islands spread across some 5,000 km of equatorial area, Indonesia is ideally suited for a domestic satellite service. Over two-thirds of its population of 161 million live in rural and remote areas.

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[17] National Policy on Education, Ministry of Human Resource Development, 1986.

Disproving the pessimistic forecasts, the telephone revenue and the sales of television sets have gone up after Palapa has gone into orbit. There are no commercials on television and the private sector is not allowed to operate any television service. A fee is levied on television receivers. Over a million television sets have been sold of which 380,000 are made domestically. About 6.5 million radio sets are also manufactured.

It would be useful to study the use of the satellite system in Indonesia in view of its several notable features. First, the space segment is fairly well set, unlike in several countries where there is uncertainty about the availability of a space link on a regular long-term basis. Second, the utilization of the space segment has been mostly on an experimental scale, but the experience has indicated the vast scope for this technology and the capability of the nation's technical manpower to utilize it imaginatively. Third, the dimensions of the problems involved in scaling up the level of usage for distance education have become clear so that the directions of growth in this sector can be realistically projected.

The space segment normally has two satellites, one of which is called in-orbit spare. Palapa-A2, launched in 1976, is now functioning as a standby, after completing its design life. Perhaps its onboard fuel will last another year. Palapa-B1 launched in 1983 should operate till 1990, though its fuel is a little bit on the low. Palapa-B2P, as the next satellite is called, is now overdue, since B2 launched from the Shuttle in 1984 did not reach the correct orbit and had to be recovered later. The launch of B2P, which has been postponed following the Shuttle disaster, is now expected in March 1987. It will be launched aboard a US Delta rocket. Built in the United States, Palapa-A had 12 transponders, while Palapa-B has 24. Each transponder can handle up to 600 channels, or one color television. Two channels are dedicated for educational use, one for voice and data and the other for slow-scan television and data transmission. In Palapa-B also there will be two channels for education but not on a full-time basis; they will be provided as and when they are in demand.

The Master Control of the domestic satellite system involving commands to the spacecraft is managed entirely by Indonesian engineers. The ground segment consists of 122 earth stations, including 72 made indigenously. Forty of them have 10 m dish antennas while 82 m have only 5 m dish antennas. Under Indonesia's Fourth Plan, another 100 earth stations, domestically made, will be added. In addition, the country's Department of Information has deployed only (TVRO) antennas. Though many of the earth stations can receive television signals from the satellite, they are not being used extensively for satellite television distribution. The next generation of satellites, Palapa-C, is proposed to operate partly in the high frequency Ku-band and then some experiments may be conducted in television direct broadcast service to 3 m dish antennas. The small ground stations cannot automatically track the satellite, which is done by the Master Control Station near Jakarta. Presently, the main task is to correct the attitude (north-south) of Palapa-A2 with regard to the earth's position.

The use of the satellite system for development education has been demonstrated in a project involving 11 universities in the eastern islands. Supported by USAID, the pilot project links the campuses of the universities to facilitate sharing of the scarce human and institutional resources. Tutor training and agricultural education have been the initial objectives. The focus was remedial courses for failed teachers organized by Hasanuddin University and IKIP (Teacher Training College), Ujung Pandang. Another program for instructors was on natural sciences and aimed at standardized curriculum. Working with the Washington State University, the project aimed at upgrading agricultural education in the eastern islands, starting with soil science. Training in curriculum development was provided by the University of Connecticut's Center for Instructional Media and Technology.

The project has been designed to use the two dedicated channels on Palapa in an interactive network. Teams in the 11 universities can communicate with one another in the teleconferencing mode. One channel can be used for telephone conversation and the other for "audiographic" link. Each campus is connected to a Palapa earth station. A telephone terminal in the "electronic" classroom provides a "teleblackboard" consisting of television monitors or a graphics tablet on which anything written with a light pen will be seen simultaneously at all sites connected. It is fully interactive as the tutor and the student at the other end can talk with each other. The television monitor can also be used for seeing broadcast television programs or for playing videocassettes. It is also possible to generate maps and graphics. The signals corresponding to the writing, etc., are carried in the audio channel (5 KHz bandwidth). In addition, a facsimile machine or telecopier has been provided; it can transmit a page every 100 seconds and can send or receive documents unattended. This will be quite useful for transmitting library materials during off-hours to all terminals at the same time. A smaller audioconference room at Jakarta for the Director General of Higher Education can also be linked and resource teachers, too, can speak from there.

2. Universitas Terbuka

With a view to providing good education at the tertiary level to an increasingly large number of students with limited faculty and institutional resources, the Government decided to start an open university (Universitas Terbuka - UT) based on modern communication technology including satellite links. Established in 1984 with its headquarters in Jakarta, UT has proved quite popular. In the first year an unexpectedly large number of applicants – 60,000 – were admitted. Though the number went down to 40,000 in the second semester, it shot up in the second year to 90,000, going down to 75,000 in the second semester. The dropout was only transitory, according to the authorities who were confident that the students would return. However, it was noted that 75 per cent of the students of UT are employed already with the result that the aim of catering to the demand by new entrants seeking higher education has to be reviewed. It is expected that UT will have an enrollment of 150,000 by 1989, out of about 6,000,000 expected to apply for college education. The fee payable by the students is the same as in a conventional government university, which is lower than that in a private college. The degree which can be obtained in six years instead of four at a regular university, is recognized as equal to any awarded in the country. This approach of treating distance education on par with the conventional methods is commendable.

The enormous number of students involved, their biodata examination papers, etc. are handled with the help of computers. The instruction depends mainly on the print medium; but it is supplemented by radio, audiocassettes and broadcast television. However, the time made available on television for broadcasting support lessons is only 25 minutes twice a month. This is hardly adequate to do full justice to the wide spectrum of courses – as many as 242 – accepted by UT. While it is noteworthy that the most difficult aspects in selected subjects can be clarified in the extremely limited time available, it can safely be predicted that the impact of the visual medium will not be effectively felt especially when the number of courses offered is proposed to be raised to 500. Further, though the satellite channel is available, the television organization would charge about $10,000 or the equivalent an hour if it is needed outside the allotted slot. Educational experts hope that with increasing demand for visual support to the UT's output, more time would be made available, especially as there is only one channel. On this hopeful note, plans for producing quality films for telecast are underway and the educational planners are scanning the market for cost-effective and innovative gadgets that would be of use to them.

With the unique advantage of having a domestic satellite with some unutilized capacity, it is but proper that the open university should make further use of the Palapa system for extending its area of benefit and for administering the program. Also, wherever audioconferencing is now carried out, one-way video could be attempted subject to technical feasibility. For example, the eastern islands intercampus link can be duplicated in a video format with inputs from agriculture, animal husbandry, etc. The present education links, providing voice and slow-scan transmission between Samarinda and Tarakan and between Manado and Luwuk could be upgraded to try video exchange. All short-wave radio (HF) links used for education (e.g. Ambon and Masohi) could be switched on to satellite.

Visual media for education attracted educationists even in the early days of satellite use in Indonesia. The Institute of Technology, Bandung, tried some experiments in television hardware. In 1977 a task force was set up to study the use of closed circuit television and other matters, followed by the establishment of a center for educational technology to plan media-based curricular programs, though its main efforts relate to television programs and equipment. A realistic scaling-up of the effort can be attempted.

The "enrichment" component of television, though on a modest scale, is fairly interesting, involving science and technology subjects as well. Television also showed a long series, consisting of 52 programs, aimed at character building among youth at the secondary school level through dramatized themes. The series was reportedly well received. Another series has just been started with the theme of Indonesia's history of the Revolution.

Universitas Terbuka cannot put off science and technology courses for too long. The country's needs for self-reliance in industrial and technological fields will demand a new and efficient way of training its human resources. The visual requirements of technical courses can be effectively met with appropriate television production facilities which can be profitably used through Palapa.

3. Radio

Radio has been used on a limited scale in Indonesia in support of educational programs. Broadcasting organizations function at national, metropolitan (in five major cities), provincial and local levels with some scope for the private sector as well.

Since 1975 radio broadcasts in support of in-service primary school teacher training have been in operation. The teachers are spread out in

17 provinces. Two production units were set up at the Center for Communications Technology in the Department of Education and Culture. It was thought that the radio program would have a wide and instant coverage, facilitate community awareness and improve the quality of teaching among the regions. As many as 320 programs, each of 20 minutes duration a year could be made. However, the quality of the signals received was poor, making it difficult to follow the program easily. Also, it was difficult to monitor the program and direct it and coordinate with other agencies involved was not efficient.

A USAID-financed study proposed the use of the satellite for transmitting educational programs which would be broadcast from the distant receiving centers or utilized through cassettes. However, the satellite has been used only for establishing telephone links and slow-scan transmission (the Eastern University link).

Radio programs were also used in the experimental open junior high school project where students learn individually but attend learning groups in base schools once a week. The pace of the radio and classroom program did not match and want of adequate funds and trained manpower for producing high-quality programs affected the popularity of the scheme.

Yet another project aimed at the eradication of illiteracy among adults. Started in 1976 with World Bank assistance, the project envisaged the use of pre-recorded instructional messages, films and slides in 13 provinces. The Teacher Training Institute (IKIP), Bandung established an educational task force (1978) for designing courses suitable for radio broadcasts and geared for open learning. Programs were broadcast on a very limited scale around the campus only.

It is time that the experience gained from the sporadic efforts at utilizing radio for education are consolidated and put on a large-scale, operational basis. Given the role of radio, it is important to ensure that it is heard loud and clear in all provinces. Satellite technology offers an efficient way of networking, both on a national and regional basis, so that the transmission is cost-effective especially as the land lines are not well developed, and technically superior. The provision for uplink facility and the downlinks in receiving stations can be combined with those for similar operation for television programs, which are also needed. The introduction of Frequency Modulation (FM) for educational broadcasts may be considered as a supplement. Further, a proliferation of radio broadcasts proves counter productive as the resources get thinly spread with the risks of the medium being confined to urban areas.

The telecommunication expertise involved in satellite link is of a fairly high standard in Indonesia. In fact, they are capable of arranging even a 'three hop' satellite link to Europe, involving Palapa and two international satellites. Intended experiment aims at connecting foreign universities with Indonesian counterparts so that research data on educational topics such as tropical medicine can be easily exchanged. The uplink will be from Canada and satellites over the Atlantic and Indian oceans will bounce the signals to Indonesia. The link in which the International Institute of Communications (IIC) is participating is called Project Satellites for Health and Rural Education (SHARE).

The high level of expertise and experience in managing an elaborate ground segment for Palapa and managing the Intelsat international system can be utilized for initiating more and more satellite-based educational programs at home. Since 1976 the Indonesian National Institute for Aeronautics and Space (LAPAN) has been involved in experiments and application of satellite-based communications. In 1979 LAPAN was officially required to carry out studies for maximizing the participation of Indonesian research institutes and industries in the preparation of future generation of the Palapa system. Given the high level of expertise in LAPAN, it should be possible to come out with innovate designs for future satellite systems. A widespread application program will provide a good base for expanding the domestic electronic industry.

E. A New Deal for the South Pacific

Distance education has been found to be the only cost-effective way of providing opportunities to the students in several South Pacific countries isolated by vast expanses of ocean. Even the use of high frequency radio will not be technically possible beyond a limited range. The satellite age has truly come to their rescue, though only a modest beginning has been made. The US National Aeronautics and Space Administration (NASA) offered an early American satellite, known as Applications Technology Satellite-1 (ATS-1) over the equator for a project called the Pacific Educational and Communication Experiment (Peacesat). With UNDP/UNESCO assistance, the satellite program based on radio relay were used by eight countries since 1972.

1. The University of South Pacific

Established in Suva in 1968 with the assistance of New Zealand, the University of South Pacific (USP) also made use of ATS-1 since 1974. USP has its extension centers in Cook Islands, Fiji, Kiribati, Nauru, Niue, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa. In addition, Tokelau is also served. Known as USPNET the service provided tutorial support for students in remote areas through its voice communication channel. It also facilitated regional discussion programs to strengthen educational services in agriculture, health, energy and marine resources. The satellite had to be switched off for technical reasons in August 1985. Efforts to find a substitute have resulted in a commercial arrangement with Intelsat, which will provide point to multipoint voice communication links for an annual fee of $30,000. Small earth stations which will work with the satellite are available in Cook Islands, Fiji, Kiribati, Solomon Islands, Tonga and Vanuatu. (Tuvalu and Niue cannot get the satellite signals.) The service was scheduled to start on 1 September 1986. The satellite will be available on a 24-hour basis, unlike ATS-1 which could be used only for five hours a day.

The satellite link will help USP expand its extension studies, its scheme of continuing education and other outreach programs. Enrollment in USP has touched a peak figure of 3,000 and there is considerable potential to be serviced. USP offers four types of courses: Preliminary, Foundation, Degree and Vocational, designed for different levels of study. The Preliminary course is equivalent to Sixth Form courses in either Science or Social Science and prepares students for tertiary study, i.e. at a higher level than that of secondary schools. The Foundation course is equivalent to Seventh Form teaching and is the base for university study. The Degree course is the highest offered by USP, while the Vocational courses are designed particularly for people already employed, who are given certificates or diplomas on successful completion of the studies. Each center of USP has a center director who may be assisted by a lecturer, to provide guidance to applicants. A program of study consists of a specified number of credits in the courses offered.

Teaching is done by means of specially written books, written assignments and often, audiocassettes. Corrected and evaluated papers are sent by mail. Part-time tutors at the centers provide further guidance to students. USP also offers both credit and non-credit courses of study during vacations.

A unique feature of USP is that nine institutes in the different countries of the Region share the teaching work. These institutes deal with a variety of subjects including agriculture, rural development, marine resources, atoll research, language, education, law and Pacific studies. USP has two campuses, one in Fiji and the other in Western Samoa. USP assists the institutes in putting the different subjects in the external mode and acts as the interface between the various specialized institutes and the students.

Each USP center also offers a number of continuing education course on a variety of subjects, though these courses do not lead to a diploma or degree. About 5,000 people participate in the programs each year. Essentially, these courses seek to develop personal skills, enhance employment capability, and support arts and culture.

According to the Director of Extension Services, Mrs. Marjorie Crocombe, there are not enough funds to engage the necessary staff to conduct the extension programs in a more effective way. USP would like to introduce new courses more relevant to the agro-industrial needs of the Region. There is an increasing demand for more advanced Extension Courses, particularly degree programs.[18] Now that a 24-hour international satellite link is available, USP would like to have access to the data banks in developed countries – a move which has not been readily welcomed by the agencies concerned. Above all, USP would like to use video eventually, as a logical culmination of their audio techniques via satellite. In fact, the production facilities for film and audio have been combined recently and USP wants some time on Fiji television as well to start with. Though the current charge for Intelsat is considerably less than the rates that prevailed only a few years ago, USP would like to keep its future options open, especially with the possibility of Pacstar and Aussat in the offing.

USAID has assisted USP with some equipment and consultancy and in conducting research. Recently, some of the Japanese-made equipment has been introduced. And there is an immediate need to strengthen the cassette-copying facilities; Tonga, for example, relies on audiocassettes.

In view of the possibility of satellite links being available on favorable terms in the Region, it would only be appropriate for USP to undertake new programs based on video support for its extension services. It would be necessary to provide assistance to USP for:

(i) modern production facilities for audio and video services;
(ii) research schemes to evolve suitable strategies for transforming higher level technical courses in the extension mode;
(iii) audiocassette duplicating facilities in various centers;
(iv) preparation of a plan to introduce satellite video in support of educational television;

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[18] Woqua, Meli V. in *Diversity Down Under in Distance Education*, edited by Kevin Smith, Australian and South Pacific External Studies Association, 1984.

(v) improved methods of designing practical workbooks in support of technical/vocational courses; and

(vi) workshop facilities for hands-on experience for those doing vocational courses.

In the area relating to (v), the Darling Downs Institute of Advanced Education (DDIAE), Toowoomba (Australia) has done some innovative work and it would be worthwhile to associate them with plans for curriculum revision or improvement by USP, especially in the field of engineering courses. Some of DDIAE's courses in Physics and Technology have been found quite useful by USP.

2. Fiji's Decision

Among the South Pacific countries, Fiji has taken an important decision relating to television. Broadcast television is scheduled to be introduced in the country in mid-1987, under a joint venture arrangement with an Australian company (Publicity and Broadcasting Ltd. – PBL). Television programs will be relayed by an Intelsat satellite over the Pacific and rebroadcast from Suva, the capital. The coverage will be extended in three stages; the signals will be beamed to 45 per cent of the country in the first stage for the densely populated areas. In the next two years, 60 per cent will be covered, followed by the rest of the islands.

PBL, which has signed a 12-year contract with Fiji for providing the television service, will initially hold 80 per cent of the shares of the joint venture. PBL will give the service free, while Fiji will give the land and related facilities. No license fee is expected to be levied and advertisements are likely to be the source of revenue. Currently, PBL gets 50 hours of programs from the US daily to Sydney via Intelsat whose footprint covers Fiji and other countries in the South Pacific. It is proposed to edit the selected items before broadcast from Fiji.

According to the Managing Director of PBL, Mr. Lynton Taylor, PBL will assist Fiji television in the purchase of foreign educational films as well as in the local production of programs with PBL's expertise and initially with some hardware as well. Though the Government is expected to have a voice in the selection of the programs, the medium is expected to have a fair scope for operating freely under a self-regulatory system subject to certain guidelines.

The Permanent Secretary for Education in the Government of Fiji, Mr. Joji N. Guivalu states that considerable importance was being given to educational programs on the television, and the fare will not be all entertainment. It is worth noting that the television will have to be quite interesting particularly because it would compete with an estimated 50,000 video sets which are extensively used by the people for watching feature films, including some pirated prints. In fact, it has been reported in the Press that one of the reasons why Fiji opted for broadcast television is to correct the "distortions in the cultural scene" brought about by films that are alien to the local culture and values. It would be necessary to introduce programs that will enrich the knowledge of an average Fijian, who has not had much exposure even to his own country.

While welcoming the efforts to make enrichment programs of a general educational nature, several experts have expressed the hope that television would be involved in making education job-oriented as about three-fourths of the school leavers are unemployed. In view of the competing demands for television time by various departments, it would be better if the authorities start educational television at the beginning itself, for, once the time-frame is frozen, it is difficult to get a breakthrough. In fact some experts see a bigger role for Fiji television. An educational program on a regional basis could be planned so that other island countries can also benefit if only they decide to put television receiver facilities. A hopeful sign in this respect is the new earth station in Vatuwaga which is being commissioned to handle television by Fiji International Telecommunications Ltd. (FINTEL) which alone is authorized to transmit electronic signals to other countries from Fiji.

Experience elsewhere has shown that once feature films get hold of an undue share of the prime time on television, it remains the staple food of the hungry medium. It becomes a Herculean task to dislodge the movie. While the role of entertainment in holding the audience is not underestimated, it would be necessary to come up with equally absorbing alternatives. It is therefore necessary to set up production facilities for making educational television programs. Given the paucity of material with a South Pacific flavor, it would be safe to predict a fairly lucrative market for good television program cassettes of an educational nature. It would also be pertinent to note that in the initial period of television, when foreign material is bound to dominate, the content should be served with commentaries and discussions (on the telecast subjects) by local people and supplemented by indigenous production based on current problems and popular themes. A training program for broadcasters in Fiji is an immediate necessity.

3. Papua New Guinea

The other South Pacific country where broadcast television was expected to begin this year (1986) is Papua New Guinea. The scheduled introduction was stopped by the PNG Government pending a public inquiry into the deal made by the earlier government with NBN 3 in Newcastle, (an Australian corporation) for television service in PNG. A subsidiary of NBN 3, Niugini Television Network (NTN) had meanwhile started legal action over the decision to stop the inauguration of the service. Before the change of government, a second license was secured by an educational video company, Media Niugini (which is linked with PBL). A new law has been passed by Parliament to prevent the introduction of television until January 1988. The Communications Minister said the new legislation would give the Government time to form a clear and logical policy based on facts. The legislation provides for a penalty of up to one million kina (same as US$) for any person found guilty of operating a television station before January 1988. The Government is reported to have taken the decision to postpone the introduction of television on grounds of cost, social effect, lack of planning and guidelines and unsuitable programs that may be offered.

Meanwhile, PNG had reportedly secured free use in perpetuity of a transponder on a Pacific Ocean satellite, and the right to an earth station in Port Moresby in return for giving the country's allotted places in the geo-stationary orbit to one (or two) Pacific satellite(s) virtually owned by a US company. PNG's advance registration of its orbit slots with ITU has been done over 175° West and 167° East longitudes.

4. Demand in the South Pacific

Elsewhere in the South Pacific, Fiji-type of service proposals have been reportedly put forward to Western Samoa, Cook Islands and Solomon Islands. Thousands of video sets are in use in these and other countries including Vanuatu and Tonga. Tonga's King is said to be pursuing plans for a television service for which an American religious organization has donated equipment. Niue hopes to have cable television soon for its small population. Vanuatu, if reports are correct, does not consider television a priority. And some countries such as Tuvalu and Kiribati lack the resources needed even for a small-scale television service. Two French territories, New Caledonia and French Polynesia have got television stations but they do not have special educational programs. In fact, American Samoa did have an "educational television" which was designed to be a pioneering experiment, but the 20-year old service in Pago-Pago is now noted for American comedies.

The lure of Western programs is widespread. In PNG, private receiver dishes were unofficially erected to catch the satellite signals, and Fiji and Vanuatu had to ban dish receivers. Though the leaders of Polynesian, Melanesian and Micronesian societies are concerned about the effect of foreign television programs on their cultures, they have not rejected the medium as such. A recent South Pacific Forum meeting directed the Management Group of the South Pacific Telecoms Development Programme (SPTDP) – (1984) to include the planning of television wherever possible within its telecommunications plan. Although not identified as a high priority, the SPTDP Report for 1986 says, "requirements for television services have arisen almost from the outset and are still arising." The Report points out that sources of programs, extent of local programs and studio facilities and the problem of regional networking are some of the issues that should be resolved before television is introduced on a wide scale. Meanwhile, it would be helpful to examine the technical options available so that the implications of cost and system planning are clarified.

Intelsat has stationed Pacific Ocean satellites (-IVA, V, VA) above the Equator and each one of them can 'see' the whole of the Pacific Region. These satellites are used for telecommunications and can be used for direct television reception as well. Small receive-only earth stations, typically 1-2 m, can receive the signals which can be retransmitted in the usual VHF mode. But the SPTDP Report is of the view that this system would be expensive and several transponders would be required to cover the Pacific Island countries even for one television channel. The Report suggests an alternative: lower power transponders from Intelsats can be leased and their wider coverage would serve larger areas such as an island (instead of a village and its neighborhood), but this system needs larger earth stations. Both the options need uplink facilities to access the satellite. Some existing stations suitable for it can be used.

The resolution of these technical issues is likely to be less daunting than the other option of engineering a terrestrial microwave radio link across difficult terrain. Moreover, microwaves cannot be transmitted to islands beyond the horizon. In contrast, the reliability of the satellite link has been proved beyond doubt and the service is taken for granted in several countries. While it is true that the island countries are now grappling with the elementary problems of providing a decent phone service, their goals are far-reaching. These countries have begun to realize the enormous scope offered by satellite links in the field of distance education. The University of South Pacific's satellite-based extension services light the proverbial candle in the darkness. The gradual spread of computers in the region is bound to generate intercomputer traffic. One-way and two-way information access systems will also become popular. The region is ideal for the introduction of electronic mail, in view of the paucity of regular air and shipping services and this can be used to transmit educational lessons as well as to remote areas. Voice communications would also strengthen education administration – an area now languishing for want of quick consultation facilities. Teacher training, particularly for those posted on islands, would acquire a new meaning and remove the present frustrations of isolated functioning.

Realizing these possibilities, the SPTDP decided to explore the possibilities of using a satellite system. In order to have an appreciation of the costs involved, all three corporations that have or will have satellites over the Pacific (Intelsat, Aussat and Pacstar) were invited to make presentations, essentially for establishing the telecommunications network for which an investment of the order of SwF300 million involving possible negotiations with the World Bank had been envisaged. It was noted that Intelsat-V can provide service through the existing ground stations in the countries (except in Tuvalu and Niue). Intelsat can give varied and flexible service to suit the thin routes involved. The use of Aussat, it was realized, would depend on an agreement of the countries and all parties concerned as it is a domestic satellite of Australia. Pacstar, a joint venture between the American TRT Co., and PNG Telecommunications Corporation would not be available before 1990, but its offer of a design for the system was found attractive in terms of cost. There were indications that the second generation of Aussat may be able to improve the services offered. Nevertheless, the three organizations presented cost studies, under two assumptions: the space segment should be permanently assigned and only the capital costs for radio equipment should be considered. The evaluation brought out certain general questions. It was realized that any space segment would be cost-effective only if it is used for both national and regional connection. As regional traffic in the South Pacific is international traffic, it was feared that there are "institutional" difficulties posed by the working arrangements now in vogue. The ideal seems to be to evolve a network where every island can be connected to every other country through the same satellite, so that television and broadcasting and other non-voice services can be properly rendered. Various technical means of achieving an optimized network with or without spot beams and involving a minimum number of channels in the satellite were examined.

5. The Role of Aussat

The role of Aussat in the South Pacific depends on the resolution of some basic issues involving Intelsat, the Australian government and the South Pacific countries themselves. Aussat is of the view that the Federal Government of Australia should decide if the satellite can be used for regional service involving exchange of television programs between different countries or should be used only for domestic purposes. It is true that the Australian Satellite Communications Act (No. 21 of 1984) permits the satellite's facilities for use in telecommunications systems for "neighboring regions." But its interpretation is not clear. Some would rule out its use for sending one country's programs to another, while allowing the satellite's use only for domestic distribution of programs of the country hiring it. Any decision in this regard would have to take into consideration the impact on Intelsat of which Australia is a member. Without the go-ahead signal of the Australian government, Aussat cannot permit the use of its spare capacity for international television program transmission. Subject to a decision on this issue, and depending on the specific demands in the future from the South Pacific countries, Aussat can have some suitable spot beams in its second generation satellites. It can, for example, provide for a powerful transponder (30 W) than is possible in Aussat II, (12 W) so that smaller earth stations can work with it.

The third satellite of the first generation of Aussat has a 30-W transponder, which is being leased by New Zealand for its domestic service. It is held by Aussat officials that New Zealand will use it for distribution of its own programs within New Zealand. However, Television New Zealand has proposed a regional non-commercial television service comprising the "best of programs" from Australia and New Zealand itself, for reception in the South Pacific countries. Moreover, it was also reported that the proposed system will relay selected programs of the island countries to all others in the region – all as a free service with no advertisements. The Fijian Deputy Prime Minister, Mr. Toganivalu, recently stated that the regional television service proposed by New Zealand could also operate in Fiji.

The scenario that is fast developing would call for a certain resolve on the part of educational experts and administrators to register their claims well in time. In fact, a well-articulated case for educational television can be a decisive factor in introducing the electronic media in the South Pacific on a reasonably extensive scale. The fear seems to be about the message, not the media.

SYSTEM DESIGN AND OPERATIONS

A. The Assumptions

Designing a satellite-based educational system is basically a country-specific task. Often educational planners have to make uneasy compromises with realities and accept the best possible solution to their problems under a given set of circumstances. However, an awareness of the contours of a system that is prone to fast changing technological innovations would enable the planners to strive for constant improvements and avoid unplanned, hasty use of the technology.

Designing the satellite-based educational system starts with certain assumptions which may themselves involve policy decisions by national authorities. Some of the major considerations to the role of television and radio as well as the appropriateness of a satellite system (see Chapter II). The assumptions, which are really prerequisites, for the educational satellite system are:

- A clear-cut policy on distance education which has short-term and long-term goals, stated specifically and not as general declarations. It should be clarified that distance education is not meant to produce second rate graduates.
- Recognition of the positive role of television and radio in distance education and a resolve to maximize their contribution.
- Willingness to examine and utilize, where warranted, space-based delivery system, without summarily rejecting the satellite technology.
- Space-based educational technology has demonstrated its capability to increase the range, the density and the flexibility of educational programs and the level of involvement can be determined according to the resources available.

B. The Policy Framework

It is necessary to have a policy framework so that administrators need not have to take ad hoc decisions which often lead to a mismatch between various components of the system and result in the lopsided development. The first requirement for a policy framework is to specify clear objectives so that the targets to be achieved are clearly known to all. Specifically the objectives could be:

- To support formal education and fill in the gaps left by conventional methods of teaching.
- To provide non-formal education to various age groups.
- To match the content of distance education to the immediate and/or long-term needs of agricultural and industrial progress of the concerned country.

Depending on the objectives chosen, relative priorities to them can be assigned and targets set. If, for example, orientation to farm and factory needs is stressed, then the ground segment of the hardware will have to be appropriately located to maximize the reach and reap the advantages of proximity to fields and factories for hands-on experience to the students. If the emphasis is on enrichment, then the space segment has to be time-shared with other demands. If remote areas are to be given preference, then suitable downlink points have to be first located and developed.

One major consideration will be the language(s) of the broadcast. A centralized delivery system such as the satellite should not resort to the use of only one language except where it is acceptable or relevant to the people in the footprint of the satellite. It is in fact necessary to provide for regional language broadcasts and this will be made possible by the use of spot beams, which can focus on specific geographical areas. If more than one language is required, time-sharing of the transponder becomes inevitable. Again, if the broadcast is nationally applicable, then the level of the language used should be commonly understood or welcomed by the viewers. In case the audience consists of special categories (doctors or engineers) visuals will have to be done on an in-depth basis. If it is decided to provide links with data banks or computers, then the ground links should be strengthened and conditioned to handle data, though the satellite capacity may be available. Further, the timing of the broadcast will depend on whether the audience is at work or in school. In other words, a decision is required on whether the emphasis should be on training those already educated (and perhaps employed) or those who are still in the school.

In view of the implications for the system, the objectives should be stated as clearly as possible. In stating the aims words such as "significant sections of society" or "poor or the underprivileged" will not be of much use. Again, there is a tendency to take on too much, just because the satellite is there. In fact, the potential of a space segment will increase the demand for services from numerous areas where such pressures were earlier held in check by the absence of land-based links. However, it should be decided that the ground segment should mostly decide the level of using the space segment. Again, in translating the objectives into the distance education mode, it is essential to bear in mind that the new technology should give a totally new experience to the viewers or listener and that it should not be a repetition of the classroom scenario. In the choice of courses, for instance, some of them such as accounting and history can be handled by the radio, while the visually crucial ones such as polytechnique or health lessons could be put on television. In both radio and television, a satellite link will facilitate the inputs from multipoints so that experts dispersed over a wide area can easily be involved in the programs.

C. Technical Options

1. Network Considerations

A conventional television antenna can serve a radius of about 80 km to 120 km depending on the height of the tower on which it is placed. The reach of medium frequency radio is also about the same, since interference from other stations and natural noise levels restrict the coverage area. In sharp contrast, a satellite will be able to provide networking facilities in which the radio and television transmitters can be linked through the satellite so that a region or the country, depending on the tie-up, can put out the same signal at the same time without depending on land-based cables/microwaves or weak off-the-air radio transmission. Networking makes it possible to serve a language area or a region with a few transmitters and give an excellent service. The transmitters can be given both regional and national feed and when they are not so engaged can be released for local programs. This is an essential requirement in view of the need to reflect the cultural diversity and regional interests. However, it would be necessary to locate a few uplinks (to send the programs to the satellite) in selected areas so as to minimize the delay and the difficulty of bringing programs produced in far-flung areas to one central point for uplinking.

There are several technical modes of service possible:

- Satellite television to terrestrial television stations;
- Satellite television to direct reception sets for community or individual reception;
- One-way video with two-way audio;
- One-way radio, with phone-in facility;
- Two-way augmented telephone link (teleconferencing);
- One-way teleblackboard;

- Slow-scan (where still pictures can be transmitted);
- Facsimile for transmission of documents and lessons;
- Interconnect computers/data banks;
- Introduce messages (subtitling etc.) along with main television program; and
- Two-way video (videoconferencing).

The choice of the modes depends on the technical feasibility, given the resources to obtain the hardware. As a general approach, it would be appropriate to incorporate the state-of-the-art technology (for example digital techniques) which will not become obsolete in the near future.

In the choice of technology, it should be realized that no one medium should be considered adequate. Often a judicious mix gives better results. The mix will, of course, depend on several factors such as the size and type of audience, the message, the existing infrastructure for telecommunication, investments possible, and availability of power and facilities for repair.

It would be necessary to strengthen the telecommunication network, particularly its interface with the satellite ground station. Otherwise, the clarity of the space link will be spoiled by the low-quality terrestrial transmitting link. Further, the idea of bringing backward regions into the mainstream through the satellite system will be defeated if arrangements for regular power supplies to operate the television are not made. Generally backward areas do not have electricity. While batteries can be tried, it would be appropriate to install solar power operated sets, especially in the tropics.

While planning the configuration of the ground segment, a repeated question is whether to allow some universities to have their own television broadcast station. For various reasons, governments in many countries may not allow educational institutions to own and operate broadcast television stations independently. FM links can give a limited reach to educational institutions but if a wider audience is involved, their transmitters can be brought into the network. What is important is that program production has to be decentralized so that the relevance and acceptability of the message are enhanced.

In areas which are electrified and which have a fairly strong demand for television sets, the satellite is connected by what is generally known as limited rebroadcast system. The merit of this system lies in the scope it offers to deploy conventional television receivers that get the signals through the local television station with the added advantage of getting local or regional programs as well. But where the density of receiving sets is not high as is likely in thinly populated areas or islands or in backward areas, a direct broadcast system is proposed. Under this system, an augmented receiver is necessary (unlike the conventional set) which will be connected to a small dish antenna. The system is operated as a community reception facility. In planning a system, the educational administrator has to bear in mind the need to spread the benefit to the backward sections of society. In areas served by the conventional sets on an individual basis, it is likely that a large chunk of society (e.g. slum dwellers) may be left out. Again, in community reception areas, backward classes and women may not be able to witness the show for social reasons. Structuring the deployment has to take care of the totality of circumstances, besides the engineering angle.

If educational broadcasts are to be effective, then their technical quality should also be good. A common complaint from those organizations which have acquired equipment on an ad hoc basis has been that their total system is unable to cope with the demand in terms of quantity as well as quality, though they are just able to meet the minimum daily requirements.

Video cameras and recording systems (replacing films) are proving increasingly cost-effective. The increased inputs from the field over a wide area demand certain features in the shooting as well as editing systems. There has been a continuous wave of innovations in the hardware relating to television production in recent years, making the field units (camera/recorder kits called portapaks) lighter, more efficient and sophisticated. New techniques in editing on video have made it possible to 'change' the scene manipulating it with a fantastic array of colors, music, sounds and graphics. In recent years improved video tape recorders (3/4" Low Band as well as High Band) have been widely used mainly for outside recordings while full-length programs are done on one inch tape. It is possible to have five "generations" of a tape (edited versions with or without additions) without losing the original quality. Computerized editing with multiple machines has been introduced in several countries, so that special effects can be mixed well and the tape edited frame by frame, if need be. Most educational programs are shot in three-fourth inch high band tapes. Of late one-half inch special tapes (Betacam) have been introduced and the quality of 8 mm unit is being improved. While the complexity of post production equipment (which facilitates animation and similar techniques) demands special skills, general video editing is relatively easy. User-friendly equipment is available to provide a simplified mobile studio also.

A field recording mobile unit can be used along with a television transmitter, a microwave link or a transportable earth station for transmission and relay from any remote location. Recording media could be either one-half inch or three-fourth inch video tape, which is cost-effective and time-saving. There is editing facility in the mobile unit itself along with an audio, lighting and test equipment. Such a unit has been designed economically by ISRO in India.[19] Video transfer and edit facility can also be provided on it.

If the right type of equipment is chosen, it would go a long way in ensuring interesting coverage from a wide area. And new ways of program presentation will become possible.

D. Planning for Human Resources

The success of satellite educational television depends not only on carefully chosen hardware but on imaginatively designed software which denotes the television programs, the methodology that goes to produce it and related requirements. Too often there is a tendency to take software for granted. While technology is neutral, software is not; the latter depends on the ideology and policy of governments and TV/radio network controllers. It is the software that transforms TV/radio from being an end itself to a means for development and education.

Satellite television and radio software for education has the following special features:

- Unlike the print medium, the reach of the satellite medium can be truly national, thereby demanding a fare which is applicable in all regions.
- Because of its capacity to serve different language areas, the satellite demands more programs than a terrestrial TV/radio.
- Imported programs can meet the needs only to some extent.
- As it reaches backward areas, the relevance of the message assumes particular importance.
- It is possible to provide professional and expert inputs from a wide 'catchment area', thereby increasing the media's involvement with a wide range of people and institutions.
- Centralized uplink to satellite often masks the need for a decentralized production to feed a variety of programs suitable for different audiences.
- There is a need to demystify the media especially as the participatory nature of the programs increases.

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[19] *INSAT Utilization for Education and Development: A System Study*, ISRO, 1979.

A basic aspect to be resolved concerns the arrangements for the production of television and radio programs. In some countries, production is entrusted to television companies; in some others where television has not developed, special agencies are set up to undertake the production. It is also common to require television organizations to produce educational programs as well.

If it is decided to use television on an extensive scale, it would be necessary to think of special arrangements as the television stations cannot cope with the work; nor do they have the special expertise needed.

Notwithstanding the institutional setup designed, the crucial factor will be the quality of the producer of the programs. The expertise they acquire in producing a variety of general television programs is no doubt an asset. Their "generalist approach" facilitates the casting of a theme in the television mode but may not yield the high definition required in the content of educational programs. Hence it is necessary to associate experts in the fields concerned in the programs. There is a feeling in some quarters that a short-cut method will be to train some teachers for the purpose. In this context, it is worth reiterating that television production is a specialized, full-time occupation; while some teachers who have the flair for production can become full-fledged producers, there cannot be a half-way house situation where teachers can somehow do it on a part-time basis. No doubt, teachers should be oriented with the medium, especially those who write the courses for it and those who appear on the screen. Teachers can serve best as subject specialists and not as producers.

Training in the team mode for television program production has been found effective as the medium demands an efficient mix of several disciplines. This type of development orientation training to television producers is provided in India by the Development and Educational Communication Unit (DECU) of the Indian Space Research Organization in Ahmedabad. DECU is an outgrowth of the 'software' activities in television program production and social research initiated for the SITE. Started in 1983 its mandate includes program production, development and adaptation of video hardware, communications research, training consultancy and studies in fields of interest to space applications. The strategy devised by DECU is of general interest to all experts involved in providing training for television production in education.

A typical television production team consists of a producer, a cameraman, an engineer, a researcher, a production assistant and video editors. The development and education-oriented training course seeks to:

- sensitize the participants to the social environment where their production will be seen;
- impart basic skills of handling the hardware; and
- give them the experience of producing three programs including one on education.

In addition, DECU has been involved in giving orientation training to educational television producers from State Institutes of Education Technology. Assistance in studio planning and equipment choice has also been provided to several organizations. It is realized that "short and basic courses can at best provide only a foundation. It is necessary to think of going beyond these to advanced courses that can lead to development of real expertise in this crucial area."[20]

DECU continues to produce television programs to test and demonstrate new methods of addressing practical problems at the village level. Several "how to" programs in agriculture, animal husbandry, health and nutrition besides those with subtle messages on social change have been made and telecast. In fact such programs with active participation of the villagers were first started in a rural area (Kheda) near Ahmedabad, in 1975 during the SITE project, by installing a low-power transmitter fed by a microwave link from the television station in Ahmedabad. The programs including those for school education are now telecast by Insat both for direct reception and through rebroadcast from all television transmitters in the Gujarat state. This experiment has become a highly significant case study for many mass communication projects that seek to utilize electronic technology in developing countries. The programs have involved the people at the grassroot level and has to a large extent demystified television technology. There was no paternalistic attitude and the villagers could talk back frankly.

The opportunity offered by satellite television and radio should be utilized not only for instructional programs but also for general programs of social relevance. The limited factors in development are really non-technical. In the words of a leading British scientist, P.M.S. Blackett:

> "In most developing countries, lack of scientific and technological knowledge is seldom a critical limited factor. The main obstacles to application are economic and social, including education, communication, acceptability of new ideas; administrative effectiveness, business enterprise and political leader-

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[20] Karnik, K.S., *Report on Education Television Training*, 1986.

leadership. Social and cultural traditions are often positive barriers to change."

Some points of general application can be detected from the Indian experience:

- Special training is necessary for educational television producers.
- There is a need to package "how to" programs with those of general social relevance.
- People's participation in television is possible and desirable as part of the learning process. It is not correct to assume that the peasants' learning capacity (for instance) is necessarily limited because of their illiteracy.[21]

It is crucial for the success of the television program, especially when it is hooked to the national network, to choose the best teacher as the impact made by that one person can make or mar the whole series. It is necessary to build television and radio personalities and not shy away from this obligation under the mistaken notions of equality of opportunity.

Since the satellite will be able to get programs from a wide area, it is all the more feasible and necessary to recognize and encourage the role of "outsiders", as it would be against the spirit of an open university to close it for outside talent. It would indeed be enriching as several experts would be able to participate, though they would need some orientation to work in the television mode. Traditional concepts of education and teaching methods are under review. The noted media scholar Wilbur Schramm said in 1968 that "If ever in the history of a school system a thorough curriculum review is called for, this is the time". This is true even today. When the demands of distance education lead to curriculum revision, it would be necessary to keep the demands of the satellite medium in view. The applicability of a single scene or even a concept to an entire country should be carefully weighed, given the forces of disunity that unfortunately still lurk around in several countries, which will try to "read" an attempt to impose a language or idea on others, where none is intended.

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[21] Rajan, Mohan Sundara, *Popular Science and Mass Media*, Allied.

E. Operations and Management

A well-planned maintenance system is necessary. The community reception sets should particularly be capable of being repaired easily with a change of modules. A workable system for fault reporting and location of breakdown brigades will be essential. The quality of the signal has to be tested frequently. Whether in schools or outside, the sets are better secured if someone (a willing teacher) is entrusted with it, so that it is switched on daily at the correct time.

In the case of an open university, it is essential to keep in touch with the teachers in charge of administration of the system. Frequent consultations will give a new sense of involvement, especially when the campuses or students are far apart and in isolated areas. The network has to be provided for putting through the links for educational administration.

Another important aspect of operations is the time slots. It has been the experience of many television networks that once a slot slips away from the educators, it is gone forever. It is therefore a wise policy to acquire the slots right in the beginning, even when it is difficult to utilize them initially in the most efficient way. A common complaint on slots is their scarcity during prime time. One should take a realistic view of the question and concede that entertainment and news and current affairs have a right to be in the prime time and at the most one or two promotional programs in favor of distance education can be inserted. A good system planning has to find other ways (separate channels, or other timings) of delivering the educational program. One way is to unload programs during odd hours and replay them, provided the educational institutions have the means for it. Insufficient channels will no doubt frustrate the ambitious educational planner but it is sometimes wise to pause and ask if broadcast television is applicable to all courses.

It is no use having the latest equipment if it transmits the same old message or in the same style. Basically, a good management principle is to ensure that there is no mismatch between the components. In some countries, there is unutilized capacity in the space segment and yet the ground segment has not been fully developed. In some others, the ground segment can be expanded but there is no satellite in sight. Or the available transponder capacity is fully utilized. It is not an unfamiliar sight today to witness the absence of even radio sets in several schools even though the educational experts fight for additional programs on the air. At the other end of the spectrum, there is a paucity of programs, as organization of the production capacity for feeding the satellite invariably lags behind the hardware in space. The "fillers" that are thrust in make no impact and often show the television controllers in a bad light.

The introduction of space links will call for an agency to coordinate the activities since the system needs the cooperation of several departments, besides education viz. agriculture, health, information and broadcasting, telecommunication, etc. Coordination becomes easier through an interministerial body with representatives from various interests, but endowed with authority. In such an arrangement, it may be necessary for the educational authorities to give up some of their "sovereignty" and "priorities" in the interests of smooth operations. After all, the interests of education are well served with the full cooperation of ministries such as agriculture, small industry and health.

Coordination at the day-to-day operational level is also required, especially to share curriculum, to pool widely dispersed expertise, and to arrange the links between laboratories and farms, or workshops. This calls for a new culture which should express itself in a readiness to share the sights and sounds of development and change in industry and agriculture. The programming calls for a fine sense of fairness and equity as several vested interests would be involved eagerly awaiting to push their products or themselves into the popular media.

A satellite medium owes an obligation to the vast audience it serves in another way. It is supposed to bring out the best talent to almost the entire audience, something no medium has ever attempted. Otherwise, the satellite will only project whoever is readily available near the uplink point, more often than not from the urban milieu. A regular program of constant scouting for talent in various disciplines should be undertaken with a view to drawing upon their talents when needed.

Management of educational television calls for interaction with mass media, both electronic and print. There is a view that television technology should be utilized only for delivery of educational programs, but care should be taken to avoid getting "polluted" with the mass media. This school of thought will not encourage screening of educational television in regular television shows. In fact, educational authorities are concerned about the "harmful" influences of the mass media on education. However, some others feel that mass media can make a positive contribution in modernizing education. Electronic media are noted for their reflection of current developments in the world without delay. The mass media would be able to "link education with the events of the day as well as with the emergence of new subject matters and new methods in education."[22]

Given the reach and power of the mass media including the print, it will be prudent on the part of the managers of distance education to enlist the cooperation of the media to spread the message relating to the availability of the new opportunities and to get the support to their efforts. The decision-makers are influenced by the "public opinion" as expressed in the press, especially where it is free.

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[22] *A Guide to Satellite Communication*, UNESCO, 1972.

If distance education is to live down its image as a dispenser of dubious palliatives to an uninformed public, if an open university is to gain acceptance in the eyes of the public and particularly the employers, if the satellite imageries are not to be cast aside as populist short-cuts to divert those knocking at the portals of knowledge, then a continuous program of vision and revision is called for. The management of distance education should therefore provide for pre-testing, feedback, and evaluation and should not fight shy of mid-course corrections. Research on the impact of the electronic media on educational and social problems is also needed.

F. Costs and Benefits

The initial capital investment in providing the space and ground segment is relatively heavy. However, the following aspects may be noted:

- It is not necessary to launch or own a satellite. Even a portion of a transponder on a satellite will be enough to start some space-linked services.
- The cost of the space link is coming down as indicated by recent trends.
- Mixing with revenue-earning telecommunication services will reduce the burden on educational administrations.
- The commercial rates charged for hiring the space and terrestrial links by many telecommunication administrations should be reviewed in the case of education.
- The penal rates, applicable in some countries to educational programs outside the limited chunks allotted should be removed.
- Where television commercials are allowed, a percentage of the revenues may be allotted for distance education.
- Part of the revenue out of the newly emerging data transmission links in some countries can be given to education.
- New avenues for earning (e.g. sale of selected television programs) should be developed by the educational institutions.

The time has come to review the traditional concepts regarding the role of the private sector in education. With specific goals such as upgrading the technical skills at various levels through distance education, it is worth exploring ways of associating the private sector in some of the ventures. The scope for the private industrial houses sponsoring certain courses through distance education may be examined. The private sector may be encouraged to donate certain components of the ground segment (such as earth stations, transmitters, studios) for operating the satellite-based system. Some of the programs may be allowed to be sponsored by the private sector and their gesture may be suitably acknowledged in the mass media.

Crucial components of innovative systems can be financed by international agencies providing assistance to developing countries.[23]

It is encouraging to note that there is a wave of renewed concern in the international community about the high cost of telecommunication technology. For example, the Maitland Report stated:

> "We recommend that manufacturers and operators be encouraged to develop systems using the latest technologies where appropriate, which will enable the needs of the more remote areas of developing countries to be met at lower costs. In many cases this would include satellite systems."

This plea may not altogether be ignored, given the enlightened vested interests involved in tapping the potential for modern technology in the developing world.

KEY ISSUES

The full exploitation of the potential of satellite television and radio for expanding and enriching distance education projects depends on the resolution of certain key issues in this field.

A. Policy for Educational Television and Radio

Basically, the very role assigned to television and radio calls for definition and refinement. Is the role marginal, sporadic and optional or is it central, continuous and essential in the distance education curriculum? A clear enunciation of policy would involve a series of decisions relating to the target audience and courses to be served (as the range is quite large from pre-primary to specialized computer courses), and their location. If remote areas were as a matter of policy given priority, then the use of satellite links may be examined. Moreover, the advantages of the satellite system viz. reliability, distance-independent links, operational flexibility and instant coverage should be kept in view while deciding the area of coverage. A policy setting the goals of satellite radio and television should indicate the priorities in terms of content and reach of the distance education programs. As a policy can be implemented only with the cooperation of several departments concerned (such as those dealing with telecommunications and information and broadcasting), besides the public, it would be useful to evolve an institutional setup which will take care of varied interests and provide a forum for sorting out rival claims and arriving at a consensus. A consultative machinery for distance education introduced at the states level (or existing advisory bodies) may be asked to hold special sessions for addressing distance education issues.

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[23] Sharma, M., *Distance Education*, Professional Staff Paper, Manila, Asian Development Bank, 1985.

B. Improving Sound Transmission

One of the most urgent issues is the availability of good radio links that are essential for distance education. The general policy response is to go in for high-powered terrestrial transmitters and locate them suitably to serve the desired areas. While it is essential to have better and additional transmitters, the question of their reach should not be lost sight of. In view of the density of the radio services, the effective reach of radio (in medium wave) is becoming less and less. The frequency modulation (FM) signals are no doubt far superior but is limited to the line-of-sight in the area served and the growth of FM is still in its early stages in many developing countries. Assuming the availability of adequate number of transmitters, satellite networking will improve the quality of their transmission considerably. This is true even if a country is not very large for a satellite. Networking can therefore be seriously considered in satellite systems.

In the near future, satellite-sound broadcasts direct to radio sets can emerge as a clear and cost-effective service but this depends on the concerted action on the part of developing countries to secure the frequencies required from ITU and on the willingness and ingenuity on the part of the countries concerned to share the hardware (and perhaps some programs) with the neighbours.

C. Introducing Video Links

Even though state-of-the-art techniques allow excellent video links via satellite, its use for education has not been widespread. The Indian experience has clearly shown the potential of using this highly effective medium for education, both formal and non-formal. While individual programs may emerge with different rankings in terms of their impact, the general strategy seems to have stood the test of time. The absence of receiver sets, the lack of community viewing, inadequate ground links to transmit the satellite signal and above all the costs involved in producing the programs have generally inhibited the regular use of the medium. The needs of an open university and those of continuing education demand that video links should be introduced, and expanded gradually. Once specific programs are drawn up, scouting for financial resources becomes meaningful. However, it is better not to introduce television half-heartedly on the basis of suboptional inputs (gifts of a few hardware) as their performance will be disappointing and may result in the option being closed for ever.

D. Approach to the Ground Segment Needs

While considering the ground segment for utilization of the satellite capacity for educational television, it would be necessary to consider the following aspects:

(i) the possibility of using cable networks, where possible to redistribute the signal received by a common antenna;
(ii) the scope for using community television in the direct reception mode for education as part of other services that can be made available through the system;
(iii) terrestrial rebroadcast by low-power transmitters to conventional television receivers, including networking on a regional and national basis;
(iv) introduction of augmented television receivers with direct-reception antennas for serving areas that have only a few sets thinly spread out; and
(v) the availability of videocassette players and the support system, if any, to use them well.

Any review of a government policy on television and videocassette recorders should promote the spread of distance education. However, in most developing countries, the spread of cable television is still at its infancy, confined to perhaps a few metropolitan cities. Hence television reception from satellite seems all the more attractive. The question of rebroadcasting to conventional sets or using direct broadcasting to receivers largely depends on the density of the sets, their geographical spread and the education policy adopted (as some governments may not utilize the community reception mode for education). Videocassette players or recorders are heavily entertainment-oriented and depend on groups willing to share the costs and are unlikely to serve the educational needs on a large scale. Some college campuses may have VCPs or VCRs but their availability in the rural areas depends on an efficient cassette distribution system which is now lacking.

E. Integrating Media Into Curriculum

Effective involvement of the electronic media in distance education calls for a true integration of the media into the courses. In other words, the teaching should be considered incomplete without the inputs through the radio or television. Otherwise, the tendency to finish a syllabus in print to the exclusion of other exposures would dominate. The need to allot a crucial role for the media should be reflected in future curriculum revision.

F. Strengthening Indigenous Production

One of the main reasons for developing countries to go slow on the introduction of television particularly in education is their unwillingness to use programs made in other countries beyond a limit. The need for indigenous production of programs has to be met. Modern studio and outdoor recording facilities are required. Cost-effective options are available, what with the emergence of versatile, reliable and user-friendly equipment for filming, editing and projecting television programs. It has become possible to dymystify television and give a real meaning to the people's participation and student involvement in the communication process. A decision to go indigenous will however call for imaginative training for the producers and others involved in the production of television programs. The orientation and the technique for producing educational programs have undergone a lot of changes and the lessons learned in developing countries should be made use of in devising training programs.

G. The Role of the Private Sector

The role of the private sector in producing quality educational programs for television and radio needs a careful review. Within the broad framework of accepted policy, it should be possible to allow a large area of freedom to innovate and experiment instead of restricting production to government departments which may bottle up creativity in a cocoon of rules and regulations.

H. Fair Deals with Satellite Operators

In the field of communication satellites which now provide broadcast links as well, it is worth noting that a buyers market is emerging, particularly in many parts of the world. The demand for space-based links is yet to be determined in terms of the services required. As a matter of general policy, developing countries try to safeguard against pure commercialization of television when international deals are made and to secure a fair deal while hiring satellite capacity or allowing the use of their slots in the orbit. It is necessary to strengthen this resolve without discouraging the beneficial foreign inputs.

I. Better Terms at Home

Securing better terms for the delivery of educational programs is an objective not only in international deals but also in the arrangements within a country especially those involving the television and telecommunication authorities or companies. Commercially based telecommunication tariffs may not allow concessionary rates for educational programs. Again, in some countries, educational programs attract penal rates if telecast during certain periods. The free time given on the air is rather limited. The lure of the commercials, where allowed, and the pressure for other programs easily erode the chunks given for education. Adding additional, dedicated channels for education may not be possible financially in several countries. Private sponsorship of certain facilities (not necessarily programs) may be examined. In countries starting with a clean slate, slots for education should be obtained right in the beginning, notwithstanding inadequate production facilities.

J. Vision and Revision

Lastly, educational satellite television and radio programs may not have relevance everywhere in the area of coverage. Quite often, a timely feedback would provide evidence to question the assumptions and recast the programs. Pre-testing, feedback and evaluation are, therefore, essential and particular issues, often involving region- or language-specific matters, should be examined with an open mind. Moreover, the novelty of approach, which is likely in an extended use of electronic media and satellites, would call for research on communication techniques in the light of social and economic conditions of the target audience. Innovation in this field is a continuous process of vision and revision.

SUGGESTIONS FOR ACTION

In view of the renewed interest shown by several countries in developing distance education, a few suggestions for possible action in the near future are given in broad terms in this Chapter.[24] The exact configuration of the projects that may be based on the suggestions would depend, of course, on the policies, priorities and resources of the countries concerned. It would also be essential to evaluate the suggestions in the light of the System Design and Operations outlined in this paper (Chapter V) as well as country-specific conditions.

A. Feasibility Studies

Feasibility studies should be encouraged wherever there is a prima facie case for using satellite television and radio e.g. in Bangladesh, Maldives, Nepal, Pakistan, Philippines and Sri Lanka, besides all the countries in the South Pacific region.[25] A set of pilot projects in distance education can be initiated to introduce and evaluate new modes of distance learning programs using satellite links. External assistance agencies such as the Asian Development Bank and the countries concerned may indicate priorities conducive to the introduction of space technology, wherever feasible, for supporting distance education.

B. University of South Pacific (USP)

(i) Increase production facilities both for audio and video programs in support of ongoing and new courses.

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[24] The subheadings do not indicate any preference or priority.

[25] *Bangladesh: Sector Study on Education, Nepal: Education Sector Study*, Education Division, Infrastructure Department, *Pakistan: Sector Study* (under preparation), Asian Development Bank, May 1986.

(ii) Introduce specialized technical courses on subjects that are of relevance to the economies of the region.

(iii) Increase the frequency of audio broadcasts in support of extension courses.

C. Regional Education Program in the South Pacific

(i) Explore the possibility of a regional education service in cooperation with the South Pacific countries, the South Pacific Bureau for Economic Cooperation, Intelsat, Aussat and New Zealand television and telecommunication authorities. Expert advice from outside the region may also be taken.

(ii) Conduct a feasibility study on providing video links for enrichment programs to the public in countries willing to participate in the project and implement the resultant plan.

D. Dialogue on the Space Segment

(i) Explore the scope for pilot projects through Intelsat involving video and audio links for selected education programs in the South Pacific.

(ii) Initiate a dialogue with others who may soon be in a position to help conduct similar demonstrations for various kinds of distance education programs.

E. Fiji

(i) Subject to the proposals of the Government of Fiji, a plan to provide adequate production facilities for producing educational television programs.

(ii) Plans to conduct research on communication needs, e.g. impact on the widespread use of videocassettes and their impact on the proposed television; and on the preferences and demands of the student population, the unemployed and women, etc.

(iii) Increase the time allotted for educational television.

(iv) A training program for producers on making television programs for education and developmental communication.

F. Indonesia

(i) Extend the reach of the Open University (UT) by providing satellite links and rebroadcast facilities in selected (remote) islands/areas.

(ii) Choose subjects for intensive treatment on television and radio.

(iii) Augment production facilities for UT's audio and video output.

(iv) Train a cadre of young producers with the appropriate orientation for producing education programs.

(v) Enable UT to introduce science and technology courses on a selective basis.

(vi) Introduce a set of agriculture and industry-oriented courses incorporating the lessons learned in the Eastern Islands University link project, using electronic media.

(vii) Introduce video transmission of selected general education programs via satellite.

(viii) Introduce community TV/direct broadcast to schools and television and radio sets to schools and colleges.

(ix) Consider satellite TV/Radio link for support to any other program of the government involving educational aspects.

(x) Pilot projects for evaluating educational data transmission between computer terminals.

G. Regional Training Institute

In view of the growing demand for indigenous production of radio and television programs for education, it is essential to provide for innovative training facilities for the benefit of the region. Instead of thinly spreading the resources that may be available for such training, it would be worthwhile to explore the scope for regional cooperation in this field and examine the idea of a regional training institute which will exclusively be devoted to educational television and radio, specializing in satellite education program production. The techniques of presentation are basically common, and the training institute can in fact grow into a resource center for the Asia-Pacific region. Pending the establishment of the proposed regional training institute, DECU in Ahmedabad can be utilized/strengthened to cater to the training needs of other countries in the region in cooperation with UNESCO.

H. Promotion of Research and Development

Though by and large satellite television technology is fairly well established, the operational aspects of individual applications call for pilot studies in evaluating the hardware. In this innovative area, countries such as Japan (with its forthcoming broadcasting satellites for the University of the Air, an independent institution with provision for broadcasting facilities), India and Indonesia (with their operational domestic satellites) can be of assistance. Some of the satellite capability can be lent for a while for agreed experiments in distance education. Also developing countries may encourage the adaptation of the sophisticated hardware, wherever profitable, to the needs of distance education. Suitable R&D programs for this purpose may be drawn up.

I. Technology Fair

One of the areas where timely and comprehensive knowledge would be useful relates to satellite ground segment and television production facilities which are undergoing tremendous change. It is suggested that a technology fair be organized where the state-of-the-art gadgets can be shown and demonstrated to decision-makers and educational experts in the developing countries. Such an occasion would be all the more useful if it is accompanied by a popular presentation of the technology so that individual claims can be appreciated in the proper perspective.

Financing and Cost-Effectiveness of Distance Education

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INTRODUCTION

Almost every country in the world puts great emphasis on educating citizens and it is the main responsibility of its government to provide at least compulsory education and higher levels of education if possible. However, due to scarce resources and other commitments spending governments of developing countries find it more and more difficult to meet the requirement of their citizens in higher education. Thus, higher education, the top of the learning ladder, frequently finds itself at the bottom of priorities when allocating funds for education.[1] After all, it is quite difficult to rationalize expenditure for another university when a high proportion of the country's population is still illiterate.

The purpose of this paper then, is to take a close look at the financing and cost-effectiveness of education, in general, and distance education, in particular, in order to draw up some policy guidelines for financing such types of education. The paper contains six sections. *Section One* is a short review of financing education in Asia and the Pacific. It describes sources and uses of funds and problems related to such financing. *Section Two* concerns policies for financing distance education. Such policies can be divided into two categories, policies by countries or in developing and developed countries, and policies for expenditures which are further divided into various types of expenses. The cost of distance education is discussed in *Section Three*. *Section Four* deals with cost-effectiveness or internal efficiency and cost-benefit or external efficiency of distance education. In *Section Five*, guidelines for financing distance education are drawn up. Those subjects mentioned for financing are capital investment which includes buildings, equipment and media, and materials, whereas the others are operating costs which normally consist of salaries and remunerations for full-time and part-time staff, delivery cost for printed materials, audio and videotapes and newsletters, broadcasting fees for television and video programs, CAI operating cost and expenses on tutorials. Sources of funds are also mentioned in this section. The *final Section* is the layout of the loan system for distance education. The system is recommended for loans to institutes to cover capital outlay, personnel development and media research and development. The other recommendation is student loans to cover institutional cost and personal cost.

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[1] Psacharopoulos, George. *Higher Education in Developing Countries: A Cost-Benefit Analysis*. World Bank Staff Working Paper No. 440. Washington D.C., November 1980, p. 1.

REVIEW OF FINANCING EDUCATION IN ASIA AND THE PACIFIC

In the last few decades, many countries in Asia and the Pacific especially developing countries are finding it more and more difficult to increase public spending on some services like education because of their low level of development and limited natural resources. Thus, the level of these services is relatively much lower. Since public services such as education are very likely not subjected to the price mechanism,[2] the question of the efficient use of resources for such activities has largely remained unattended. Hardly any attempt is made to work out alternative methods of providing services with lower unit cost. The main reason is that if such services cannot be properly priced how can we justify any other proper method of servicing with lower cost per unit. Nevertheless, for education services which are largely provided by the government, the alternative for the price mechanisms to achieve efficiency in use of resources is internal evaluation of a system through the study of its cost-effectiveness. This will be mentioned fully in the latter part of the paper.

Governments of developing countries in Asia and the Pacific are hard pressed for resources which are relatively scarce. The potentiality for mobilizing more resources is limited by the low level of development. Thus, governments in these countries are often faced with a vicious circle of fulfilling the aspirations of the people which necessarily require more resources. Almost every year the budget allocated to education is insufficient. Besides, a big portion of such budgets is given to primary and secondary education leaving a very small amount of such budgets to higher education. When the linear expansion of education, particularly higher education, has almost come to a halt due to scarce resources, a pertinent question that arises is how to provide better and sufficient education given such scarce resources, or in other words, how efficiently are the resources allocated to higher education utilized? Recently a new concept of higher education pioneered by the United Kingdom's Open University known as "Open Learning" is becoming more and more popular in many developing countries throughout the world and quite a few developed countries. The concept of having an open university aims at solving the abovementioned problems in order to better serve thousands and thousands of people who need higher education but cannot normally be educated in conventional universities.

Education is a major resource user. According to estimates by

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[2] Sharma, G. D., *Institutional Costs of University Education*, New Delhi, 1980, p. 2.

UNESCO, the total public world expenditure on education in the mid-1970s was more than $300 billion.[3] Taking into account private expenditure and the foregone earning of those in school the actual resource cost of education should be well above double this figure. Expenditure on education varies from case to case and can be divided into several categories such as between type of country distinction, between education level distinction and between fields of study distinction. Table 2.1 shows two dramatic differences between developed and developing regions in the distribution of public educational expenditure. The first difference refers to the fact that 85 per cent of the world expenditure in education takes place in developed countries, whereas only 15 per cent of such expenditure is spent by developing countries. The second point to note is the similarity of expenditure as percentage of GNP spent by countries in each region. However, when expressed in relative terms, the expenditure spent by developing countries is only 4.3 per cent of their GNP, whereas the corresponding figure in developed countries is 6.2 per cent. Clearly, developing countries put nearly as much effort as developed countries into financing their educational systems.

Table 2.1: Public Expenditure on Education by Region and as a Percentage of Gross National Product (1982)

Region	Value ($ billion)	World Education Expenditure Percentage	 As Percentage of GNP
North America	231.9	37	6.9
Europe	224.4	35	5.6
Africa	19.6	3	4.4
Latin America	36.5	6	4.2
Asia	103.6	17	5.1
Oceania	11.4	2	5.8
Developed Countries	535.8	85	6.2
Developing Countries	92.0	15	4.3
World	627.8	100	5.8

Source: UNESCO (1984), Table 3.12

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[3] Psacharopoulos, George, *op. cit.*, p. 5.

Table 2.2 presents the typical education budget allocation in a few selected developed and developing countries. Although there exists wide variation between individual countries, primary education in developing countries typically absorbs about 40 per cent to 50 per cent of the total education budget whereas the shares of secondary and higher education are only about 20 per cent to 10 per cent, respectively.

Table 2.2: The Allocation of Public Current Expenditure by Level of Education (Percentage)

Country	Year	Primary (1st level)	Secondary (2nd level)	Higher (3rd level)
Bangladesh	1982	48.3	26.6	22.3
	1983	45.8	30.8	20.8
Fiji	1981	53.0	45.1	1.9
Hong Kong	1982	32.4	35.1	25.2
	1983	31.2	36.7	24.9
India	1980	36.9	24.2	13.5
Israel	1981	33.3	29.8	24.0
Japan	1982	37.7	35.1	10.5
Malaysia	1982	33.6	34.0	14.0
Nepal	1982	48.6	[a]	44.2
Pakistan	1981	38.9	32.6	19.7
Philippines	1982	61.0	12.1	22.1
Republic of Korea	1983	51.4	37.0	10.9
Singapore	1982	34.3	34.4	26.4
Sri Lanka	1978	[b]	86.1	8.7
Thailand	1982	61.1	21.1	14.5
	1983	60.2	21.1	13.8

Source: UNESCO, *Statistical Yearbook*, 1985, Table 5.3.

[a] Data refer to regular and development expenditure.

[b] Included in 2nd level.

The allocation pattern shown above is the end result of the interplay between high enrollments and low unit cost of the primary and secondary level of education on the one hand, and low enrollments and high unit cost at the higher level of education on the other hand.

As for the field of study distinction, published statistics on expenditure are extremely scarce because the accounting of the spending unit is performed at the global level and many departments share overhead costs especially those for administration and libraries. However, it is possible to look at the allocation of funds by field of study via the enrollment data in these fields. Table 2.3 shows the percentage of university enrollments by field of study in an international cross-section. The table reveals a striking similarity in the share of enrollments in different fields of study among developed countries, developing countries and the world.

Table 2.3: The Distribution of University Enrollment by Field of Study Mid-1970 (Percentage)

Subject	Developed Countries	Developing Countries	World
Humanities	17	19	19
Social Sciences	19	19	19
Sciences	10	10	10
Law	6	9	8
Education	15	12	12
Engineering	11	11	11
Agriculture	2	4	4
Medicine	12	9	10

Source: Based on the International Cross-section Sample, Appendix A.

When considering public expenditure on education for the developing member countries (DMCs) of the Asian Development Bank (ADB) (only those with available data), it reveals the fact that most of them spend only a very small amount of their gross national product in education and no country spends more than 7.8 per cent of the gross national product on education. If we compare public expenditure on education with total government expenditure, it turns out to be that most of these countries' public expenditure on education is around 10–20 per cent. Details are given in Table 2.4.

The operations of any educational institute regardless of differences in either levels or categories are heavily dependent on funds from various sources. In most developing countries, a majority of the operating budget comes from the government, whereas in developed countries, the private sector is investing a lot in education. As already mentioned, the total government budget for higher education is relatively low when compared with the budget given to primary and secondary levels of education, although when expressed in per capita term, it turns out to be the opposite. Thus, many higher educational institutes have to use student fees and other sources of funds such as donations, endowments and profits from some activities as a part of the operating expenses.

Table 2.4: **Percentage of Public Expenditure on Education as Per Gross National Product and Total Government Expenditure for some DMC, in 1982**

DMCs	As per cent of GNP	Public Expenditure on Education As per cent of Total Government Expenditure
Bangladesh[a]	1.9	8.6
Burma[b]	1.6	12.2
Fiji[c]	5.9	11.3
Hong Kong	2.9	15.0
India[c]	3.0	9.6
Indonesia[c]	2.2	9.3
Israel[c]	7.8	6.8
Japan	5.7	19.1
Republic of Korea	4.0	21.5
Malaysia	7.5	n.a.
Nepal	2.6	n.a.
Pakistan[c]	1.9	5.1
Papua New Guinea[d]	4.7	14.2
Philippines	2.0	n.a.
Sri Lanka[a]	3.0	7.1
Thailand	3.9	20.1

[a] 1983
[b] 1977
[c] 1981
[d] 1979
n. a. not available
Source: UNESCO, *Statistical Yearbook*, 1985.

As for the proportion of each type of revenue, it was found that government budgets contribute a major portion of the revenue in conventional education and/or developed countries, whereas in distance education in developing countries student fees are higher. Some distance education institutions (Table 3.3) show that government's budget is of higher proportion to student fees, whereas others show the opposite.

If we compare the proportion of a government budget allocated to higher education between conventional universities and distance teaching universities in DMCs of the Bank, we find that distance teaching universities receive an extremely low percentage of such budget. Take the case of Thailand, for example. In 1985, the total government budget allocated to Sukhothai Thammathirat Open University (STOU) was only 1.3 per cent of the total higher education budget, whereas the total number of students admitted by that University was three times the number admitted by all conventional universities in that country (70,000:20,000 students). Details of the total budget given to those two categories of higher educational institutes are given in Table 2.5.

Table 2.5: Government Budget Allocated to STOU Compared with Total Higher Education Budget, 1980-1985

Unit = Baht

Budget Year	Total Higher Education Budget	Budget Allocated to STOU	Percentage
1980	3,475,909,500	17,731,800	0.5
1981	4,019,747,300	46,857,900	1.2
1982	4,453,835,850	55,037,800	1.2
1983	5,068,237,620	69,647,800	1.4
1984	5,215,200,000	89,573,700	1.7
1985	5,419,621,000	68,136,000	1.3

US$1 = Baht 27.00

Source: Wichit Srisa-an and Tong-in Wangsotorn (1986), Table 11, p. 51.

The revenue of any educational institution, received either from the government budget or from student fees or from other sources, is spent for various purposes such as for buildings, equipment, media and materials. The other part of spending is the operating costs which can be divided into staff development and training, remuneration, teaching aids, textbooks and other teaching media, manpower development and others. As might be guessed, total spending on buildings and equipment is usually initially high and contributes a great part of the total cost of any educational institute. However, such cost is greatly reduced once investment in such items is sufficient. Therefore the total cost of an instructional activity can be divided into two categories: fixed and variable cost elements. Fixed costs refer to the part of the total cost that is independent of the scale of the activity such as building equipment and broadcasting programs. In the case of a conventional university lecture not being attended by any student or attended by thousands of students, the cost is the same since it has already been accrued solely by making the lecture available. In the case of distance education, the cost of broadcasting is a good example of fixed cost. It does not make the slightest difference to the cost of the program whether a million students watch the broadcast or none at all.

Variable costs comprise the part of the costs that are affected by the number of students. If student numbers increase, total variable costs also increase. One may think of such type of costs as paper costs in the case of written materials, tutor wages or compensation in the case of tutorial sessions, number of classrooms and instructional materials and any other expenses that vary with student numbers. In many cases, the difference between variable and fixed costs is not as clear-cut as it should be. For example, in the case of distance education, the use of video recorders at local study centers might be at first considered as fixed costs since the center is provided with a certain number of recorders. However, if the student number increases, more recorders will have to be made available and such costs might be regarded as variable costs. Details of each type of cost will be given later in this paper.

As already mentioned above, in most developing countries, funds or finances for education are usually not enough, especially for advanced or technical education. Most of the government budget allocated to education is in primary and secondary levels because these types of education are compulsory and considered as a basic need for the population. Nevertheless, higher education is becoming more and more important and should be funded adequately in order to better serve the majority of the population.

POLICIES REGARDING THE FINANCING OF DISTANCE EDUCATION

In the study by Lord Perry, the Honorary Director of the International Centre for Distance Learning of the United Nations University, there are three types of distance learning institutions (see Table 3.1):

(i) founded for distance learning primarily;
(ii) founded as conventional and now doing distance learning; and
(iii) conventional institutions developing distance learning.

Table 3.1 shows the worldwide picture of distance education. For Asia, of 25 institutions in the sample, six institutions were founded primarily for distance education.

For the DMCs of ADB, the data are presented in Table 3.2. It should be noted that only the countries which have open universities are grouped under distance education. The rest are grouped under external studies and others even though some countries are developing distance education institutions now.

Table 3.1: How Distance Learning Institutions Were Founded

Region	Institutions: Founded for Distance Learning Primarily	Institutions: Founded as Conventional and Now Doing Distance Learning	Institutions: Conventional Institutions Developing Distance Learning	Total
Africa	10	4	2	16
Asia	6	10	9	25
Australia	13	20	7	40
Europe (East)	–	–	–	–
Europe (West)	57	27	17	101
Middle East	1	–	–	1
North America	30	41	31	102
South and Central America	7	5	7	17

Sources: Perry Walter, *The State of Distance Learning: Worldwide* Keynes Milton, United Kingdom: The Open University, (1984), p. 7.

Table 3.2: Countries Offering Distance Education

Distance Education	External Studies and Others
India	Bangladesh
Indonesia	Bhutan
Pakistan	Burma
People's Republic of China	Fiji
Republic of Korea	Hong Kong
Sri Lanka	Malaysia
Thailand	Nepal
	Papua New Guinea
	Philippines
	Socialist Republic of Viet Nam

From this table we will discuss policies concerning distance education in two aspects: distance education for whom and who pays for distance education. Since data are limited, some countries may be neglected in our discussion.

A. Distance Education for Whom

1. India

The Indira Gandhi National Open University was established in 1985 to advance and disseminate learning and knowledge by a diversity of means. It provides an opportunity for higher education to large segments of the population. It encourages open university and distance education systems in the country by coordinating and standardizing the systems throughout the country. It aims at relating education to the needs of employment, to provide access to higher education to the disadvantaged groups and to unlock opportunity for upgrading knowledge and skills.[4]

2. Indonesia

In 1984, the Universitas Terbuka (UT) was established by Presidential Decree. The main purposes of the UT are to increase the absorptive capacity of higher education and to meet the need for university graduates for the sake of national development.

Another purpose of the UT is to provide the opportunity for higher secondary school graduates, both for those who have found employment as well as those who have not, and for the old and the young to obtain education at the tertiary level in an effort to enhance the knowledge and skills which suit their respective talents and interests. This goal is in line with the principle of lifelong education for education personnel and other people stationed in small towns and rural areas in particular. The UT offers an additional advantage, namely that students can increase their level of education without having to leave their daily tasks.[5]

3. Pakistan

The Allama Iqbal Open University (AIOU) was established in Islamabad in 1974 as the only Pakistan institution providing distance education at the tertiary level. The University is designed to cater to the needs of the following groups:[6]

(i) working adults who cannot attend formal institutions;

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[4] Indira Gandhi National Open University, Information Brochure, New Delhi, 1985.

[5] Ministry of Education and Culture, *Information Booklet on Universitas Terbuka*, Jakarta, 1984, p. 2.

[6] The Open University, United Kingdom, *The Allama Iqbal Open University of Pakistan*, Milton Keynes, Open University, p. 4.

(ii) housebound women wishing to improve their education;
(iii) in-service teachers, to improve their teaching methods and keep them abreast of changes in curricula and syllabi; and
(iv) those unable to attend formal/conventional institutions such as location (remote areas) physical handicap, or cost.

4. *People's Republic of China*

In China, television universities were set up in 1960 in big cities. With regard to the development of distance education, it has been stated that there should be training of personnel in various levels to raise their professional and educational qualifications. Alongside the development of conventional universities, there should be further development of TV universities and correspondence colleges and universities which offer courses in science and technology, as well as basic introductory courses especially in the fields of finance, economics and law.[7]

5. *Sri Lanka*

A firm basis for the establishment of an Open University in Sri Lanka was laid down in the University Act of 1978. The educational program is designed to meet national education and training needs and to offer an opportunity to the many who have the dedication and drive to succeed. It grows out of the conviction that education is not only for a privileged group in society or confined to childhood and adolescence, but that all people should have access to that extent and kind of education which their full development requires, and that education should be a continuous process from infancy to the end of life.[8]

6. *Thailand*

Sukhothai Thammathirat Open University (STOU) employs distance learning techniques to enable the students to study by themselves without having to attend classes as in conventional universities. In this way, adult education is provided to those who are working so that they have a chance to raise their educational standards. People in all walks of life are given opportunities to enrich their knowledge and improve their professional competence. Moreover, opportunities for high school graduates are increased.

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[7] UNESCO, *Distance Education in Higher Education*, Bangkok, UNESCO Regional Office for Education in Asia and the Pacific, 1983, p. 10.

[8] The Ministry of Higher Education, Sri Lanka, *An Introduction to the Open University of Sri Lanka* Colombo, Sri Lanka, the Ministry of Higher Education, 1980, p. 1.

7. Japan

Japan established the University of the Air (UA) as an open university in 1985.

The aims of the University of the Air are:[9]

(i) to provide working people and housewives with the chance of lifelong university level education;
(ii) to provide an innovative and flexible system of university level education open to high school graduates; and
(iii) to cooperate with existing universities and make full use of the latest scientific knowledge and new educational technology in order to offer a system of higher education which matches contemporary needs.

From the above objectives, we can summarize the target groups to be served by distance teaching universities as follows:

	Category		
Location	**High School Graduates**	**Working Adults and Housewives**	**Senior and Disabled**
Urban	I	III	V
Rural	II	IV	VI

While conventional institutions are mostly concerned with type I and II students, distance education institutions can cater for the needs of types II, III, IV, V and VI. This is the advantage of distance education.

B. Who Pays for Distance Education

There are three principal sources of funds for distance education:

(i) government
(ii) student fees
(iii) donations and others

1. Income from the Government

From Table 3.3, it can be seen that income from the government varies among countries. STOU, Korea Air and Correspondence University (KACU) and Andhra Pradesh Open University (APOU) seem to rely less on the government.

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[9] The University of the Air Foundation, *The University of the Air*, Chiba City, Japan, The University of the Air Foundation, 1984, p. 5.

2. Income from Student Fees

This category of income also varies among countries. APOU relies heavily on student fees (82.04 per cent). The Republic of Korea's KACU and Thailand's STOU rely moderately on student fees, 32 and 30 per cent, respectively. Student fees in Japan are about 20 per cent. Indira Gandhi National Open University (IGNOU), in the beginning, seems to rely less on this source of income, as presented in Table 3.3. Indonesia's Universitas Terbuka stated, "The funds needed to operate the UT are obtained from the Government through the State Budget, from the students through their tuition fees and from other sources."

C. Expenditure

What are the major categories of expenses for distance education? Though our data are limited, we can make some generalizations: the cost of distance education varies with the types of media used. The more media the institution uses, the higher the cost.

(i) As STOU uses multimedia techniques, the major types of expenses are media costs. In 1984, the University spent 36.65 per cent on instructional materials, 4.93 per cent on audiocassettes, 2.28 per cent on radio programs, 7.26 per cent on TV programs and 5.77 per cent on tutorials. The multimedia cost 56.89 per cent of the total expenses.
(ii) For IGNOU at the initial stage, it seems that much more capital investment is needed. Therefore, capital cost in 1986-87 fiscal year represents 69.66 per cent of the total expenditure.
(iii) The experience of the University of the Air indicates that the electronic media is quite expensive. The operating expenses alone in 1986 represented 41.81 per cent of the total budget.
(iv) Everyman's University spent a large portion of the budget on course production. In 1985-86 fiscal year, the University spent 29.11 per cent for personnel involved with course development, 13.83 per cent on course operation and 15.40 per cent on printing and publishing. This indicates that the main medium used by the University is printed materials.

Therefore, various distance education institutions have different types of expenditures, depending on the media used, as presented in the following tables:

Table 3.3: Sources of Funds for Distance Education

Country	Year	Percentage by Source		
India				
Andra Pradesh Open University	1986-87	Grants	=	16.18
		Fees	=	82.04
		Others	=	1.78
Indira Gandhi National Open University	1986-87	Grants	=	98.95
		Fees	=	0.66
		Others	=	0.59
Republic of Korea				
Korea Air and Correspondence University	1985	Government	=	32.00
		Fees	=	68.00
Thailand				
Sukhothai Thammathirat Open University	1984	Government	=	22.72
		University Revenue	=	77.28
		Fees	=	30.11
		Others	=	47.17
	1985	Government	=	18.32
		University Revenue	=	81.68
		Fees	=	30.86
		Others	=	50.82
Japan				
University of the Air	1985	Donations	=	2.02
		National Subsidy	=	81.21
		Government Capital	=	4.95
		Fees	=	11.82
	1986	Donations	=	2.27
		National Subsidy	=	72.98
		Government Capital	=	5.63
		Fees	=	19.12
Israel				
Everyman's University	1984-85	Government Grants	=	38.50
		Other Grants	=	17.50
		Fees	=	26.50
		Others	=	17.00
	1984-86	Government Grants	=	40.00
		Other Grants	=	20.00
		Fees	=	27.00
		Others	=	13.00

Source: From correspondence with the heads of the institutions.

Table 3.4: STOU Expenditures, 1981-1984

Activities	Year			
	1981	1982	1983	1984
	Percentage			
1. Administration	18.13	21.27	16.44	22.62
2. Instructional Materials	37.55	40.11	44.05	36.65
3. Audiocassettes	2.90	5.25	4.89	4.93
4. Radio	5.28	4.51	3.33	2.28
5. TV	5.98	8.80	6.79	7.26
6. Tutorial	12.01	6.38	4.20	5.77
7. Examination	10.03	6.87	8.55	10.24
8. Residential Schools	–	–	2.50	1.61
9. Academic Service	8.12	6.81	9.25	8.64
Total	100.00	100.00	100.00	100.00

Source: Suna Sithilertprasit, Pensri Thipsuwankul and Thanachai Yomchinda, *Analysis of Expenditures, Sukhothai Thammathirat Open University* (STOU), 1986, mimeographed.

2. *India's Indira Gandhi National Open University*

Table 3.5: IGNOU Expenditures, 1986-87

Items	Percentage	
Revenue Account	30.34	
1. Administration		1.91
2. Common Services		4.88
3. Academic Programs (Regional and Study Centers)		15.57
4. Computer Division		0.59
5. Registration and Evaluations Division		0.72
6. Library and Documentation Division		0.99
7. Publications		1.71
8. Grants to Other Institutions		1.98
9. Estate Management Division		0.86
10. Miscellaneous		0.72
11. Provision for Conveyance Advance		0.26
12. Provident Fund and Pensions		0.13
Capital Account	69.66	
1. Development of University		32.06
2. Other Capital Expenditures		37.60
Total		100.00

Source: Calculated from *Indira Gandhi National Open University, Budget Estimates: 1986-1987, Summary of Expenditure.*

3. Japan's University of the Air

Table 3.6: UA Expenditures, 1985 and 1986

Items	Per cent	
	1985	1986
Salaries	23.04	23.91
Administration Expenses	19.86	21.06
University of the Air Operating Expenses	42.82	41.81
– Student Recruitment	(2.35)	(2.40)
– Preparation of Materials	(23.49)	(22.33)
– Education Research	(9.82)	(11.97)
– Installation	(7.16)	(3.11)
Transmission Station	6.01	5.57
University of the Air Foundation (Government Capital)	4.94	5.63
Donations	1.58	1.30
Reserve Funds	1.74	0.70
Total	100.00	100.00

Source: Calculated from *Budget for the 1985 and 1986 Fiscal Year, University of the Air.*

4. Israel's Everyman's University

Table 3.7: EU Expenditure, 1984/85 and 1985/86

Items	**% of Total Expenses**	
	1984/85	**1985/86**
1. Department of Studies		
– Administration		
– Coordination, Follow-up		
– Production and General Expenses	7.09	7.23
– Courses-personnel	30.94	29.11
– Development and Research	1.03	1.38
– Production of Study Aids	2.83	4.01
– Course Operation (Instructors, Examiners, etc.)	13.34	13.83
2. Student Administration	10.50	10.98
3. Printing and Publishing	14.96	15.40
4. Computer Service	2.79	2.86
5. Library	1.07	1.05
6. Administration	7.73	7.17
7. Maintenance and Overhead	6.44	5.99
8. General Reserve	1.29	1.01
Total	100.00	100.00

Source: Calculated from *Budget Proposal for 1985/86 Academic Year, Everyman's University*.

COSTS OF DISTANCE EDUCATION

A. The Media and the Cost

In general there are two major approaches in the development of a distance teaching system: the Uni-Medium or Single Medium System and the Multimedia or Mixed Media System.[10] The extramural study programs of various universities in Australia, which use printed materials exclusively, are a good example of the Single-Medium System. Most open universities employ the Multimedia System and feature printed materials as the core medium. This is true of the Open University in the UK, STOU in Thailand, and other open universities in the DMCs. In Thailand, STOU employs the following media:

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[10] Srisa-an, Wichit, *Distance Education: STOU Approach*, Thailand, STOU Press, 1986, p. 14.

(i) Main media: correspondence texts, textbooks, workbooks, radio and television broadcast handbooks, etc.
(ii) Support media: radio and television broadcasts, including broadcasting of videotapes and course materials recorded on cassette tapes, and
(iii) Tutorial and counselling sessions at various regional and local study centers.

In India, the IGNOU uses "printed material, radio and television broadcasts, audio and videocassettes". In addition, there will be personal contact programs and summer schools for face-to-face instruction. In the study of science subjects and technology, home experiment kits will be supplied to the students to enable them to understand practicals on their own. [11]

At the Universitas Terbuka, Indonesia, students are required to carry out the following activities:[12]

(i) to study the written materials which have been programmed as their main activity;
(ii) to interact with their tutors;
(iii) to interact with their study groups;
(iv) to listen and watch the audio and audiovisual programs which are intended to supplement or support the written materials;
(v) to practice and conduct laboratory activities;
(vi) to take unit tests and the semester final examinations; and
(vii) to conduct research and prepare a thesis relating to the principal program.

In Pakistan, Allama Iqbal Open University uses multimedia techniques. The main components of its teaching system are:[13]

(i) correspondence packages, which include self-learning printed texts and supplementary study material;
(ii) radio and television broadcasts specially prepared for distance learners;
(iii) tutorial instruction through correspondence and face-to-face learning at study centers, where possible, with workshops

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[11] Indira Gandhi National Open University, Information Brochure, New Delhi, 1985

[12] Ministry of Education and Culture, Information Booklet on Universitas Terbuka, Jakarta, Universitas Terbuka, 1984, p. 4.

[13] Allama Iqbal Open University, *The First Ten Years, 1975–1985*, Islamabad, Pakistan, Printing, Packaging & Paper Converting Corporation, 1986, p. 7.

where appropriate; and

(iv) course assignments as an instrument of teaching and continuous assessment.

Other open universities are also using multimedia. In the survey by Lord Perry, 93 per cent of the programs of distance education in Asia used correspondent materials. Forty-five per cent of the programs used residential schools. In Australia, 99 per cent of the programs used correspondent materials, 70 per cent used audiocassettes and 51 per cent used residential schools. The data are presented in Table 4.1.

Table 4.1: Number of Programs Using Various Transmission Methods as Percentage of the Total Number of Programs

Percentage of Programs Using	Region	
	Asia	Australia
Correspondence	93	99
Telephone	7	34
Regional Services	26	40
Study Centre	31	31
Radio	36	11
TV	19	6
Audio	38	70
Video	17	42
Practical Work	33	48
Kits	–	44
Residential Schools	45	51
Others	2	15

Source: Walter, Perry, *The State of Distance-Learning: Worldwide*, Milton Keynes, UK, The Open University, 1984, p. 7.

From this table, one can assume that the cost of distance education of any institution varies with the type and number of media chosen. Discussions about costs will be presented in the next sections.

B. Cost Model for Distance Education

1. Distance Education System

In our previous study,[14] we have conceptualized distance education as consisting of the following systems:

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[14] Srisa-an Wichit and Tong-in, Wongsotorn. "The Management and Economics of Distance Education: The Case of Sukhothai Thammathirat Open University" in Wichit Srisa-an, *Distance Education: The STOU Approach* Thailand, STOU Press, 1986, p. 44.

(i) admission and registration system
(ii) product system
(iii) delivery system
(iv) instruction system
(v) examination system
(vi) administration system

The admission and registration systems are grouped together with the administration system and also delivery systems under the instruction system, because delivery is done for the purpose of instruction. We can conceptualize the total system as consisting of four parts:

(i) production system (p)
(ii) instruction system (i)
(iii) evaluation system (e)
(iv) administration system (a)

The chart illustrating the total system is provided below.

Instructional and Administrative System

Production Instruction Evaluation

Administration
(including registration)

2. Cost of the Total System

Total costs of the system consist of fixed costs and variable costs.

$TC = TF + TV$
$TF = TFp + TFi + TFe = TFa$
TFp = Total fixed cost of production system
TFi = Total fixed cost of instruction system
TFe = Total fixed cost of the evaluation system
TFa = Total fixed cost of the administration system
$TV = TVp + TVi = TVe + TVa$
TVp = Total variable cost of the production system

TVi = Total variable cost of the instruction system
TVe = Total variable cost of the evaluation system
TVa = Total variable cost of the administration system

Therefore, the total cost is the summation of the above categories.

$$TC = TFp + TFi + TFe + TFa + TVp + TVi + TVe + TVa$$

But in the open university, most of the fixed cost is the capital and the variable cost is the operation, we can substitute the values:

$$TC = TKp + TKi + TKe + TKa + TOp + TOi + TOe + TOa$$

$$\text{Average Cost} = \frac{TKp + TKi + TKe + TKa + TOp + TOi + TOe + TOa}{\text{Full-time Student Equivalent}}$$

C. Cost Components

1. Capital Costs

Capital costs consist of land, building and equipment. For production and instruction systems, capital costs vary with types of media, as shown in Table 4.2 below:

Table 4.2: Facility Needs for Production and Instruction

Media	Production	Instruction
Printed Materials	Print Shop/Warehouse	Post Office
Radio	Production Center	Broadcasting Station
TV	Production Center	Broadcasting Station
Audio	Production Facility	Record Player
Video	Production Facility	Videotape Player
Tutorial	–	Study Center
Practical Work	–	Demonstration Farm Laboratory/Hospital
Kits	Shop/Factory	
Residential School	–	Hotel/Seminar Center
CAI	Computer	Computer Terminal

2. Operational Costs

Operational costs that vary with the types of media are shown in Table 4.3.

Table 4.3: Operational Costs for Production and Instruction

Media	Production	Instruction
Printed Materials	Manuscripts Copyright Printing	Mailing
Radio	Producer's time Tapes Maintenance	Broadcasting time
TV	Producer's time Tapes Maintenance	Broadcasting time
Audio	Producer's time Tapes	Staff's time at the study center
Video	Producer's time Tapes	Staff's time at the study center
Tutorial	Tutorial packages	Tutor's time
Practical Work	Student guides	Tutor's time Supervisor's time
Kits	Labor Cost Materials	–
Residential School	Tutor's guide	Tutor's time
CAI	Courseware	Computer time

D. Private and Opportunity Costs

In addition to institutional costs, there are two categories of costs: private costs and opportunity costs.

1. Private Costs

There are two types:

(i) Expenses for tuition fees and study materials. For students at STOU, our previous estimate is approximately 6.6 per cent of the income of students who earn the degree in two years.[15] This is low compared with some conventional universities, and much lower compared with private universities and colleges in Thailand. Cost comparison is provided in the next section; and

(ii) personal expenses of students are composed of the following:
  - travel expenses for tutorial sessions, final examination and residential schools
  - other expenses, such as costs of make-up examinations and sending letters and requests to the university

These expenses are minimal to students because distance education institutions provide tutorials, counselling and examination to students at the study centers which are close to their homes.

2. Opportunity Costs

They are also minimal or none because open university students are adult working people. They are generally in full employment and contributing to the GNP of their countries.

In Thailand, STOU has helped to reduce social costs. For example, in 1985 there were 89 convicts enrolled with STOU and in 1986 there were 79. With the cooperation of the Department of Corrections, Ministry of the Interior, the University provides distance education to these people in the prisons. Graduates of this program are expected to function as good citizens of the country.

COST-EFFECTIVENESS

In our discussion about cost-effectiveness, we take the definition that "Cost-effectiveness (CE) analysis refers to the evaluation of alternatives according to both their costs and their effects with regard to producing some outcome of set of outcome".[16] The alternative here is between conventional universities and distance education institutions. We further assume that "certainly, there is no evidence that distance teaching per se is less effective than conventional teaching."[17] Accepting the effectiveness of education of both systems, we look into the costs and the efficiency. As Chang and his colleagues stated, "more specifically, efficiency in our case can be defined as effective instruction at the lowest possible costs – cost-effective instruction in a literal sense."[18]

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[15] *Ibid.*, p. 55.

[16] Levin, Henry M., *Cost-Effectiveness: A Primer*, Beverly Hills, California, Stage Publications, 1985, p. 17.

[17] Rumble, G., "Economics and Cost Structure", in Kaye, A. and Rumble G. (eds.), *Distance Teaching for Higher and Adult Education*, London, The Open University Press, 1981, p. 225.

Having established the base for comparison, we now take a look at the experiences of various countries having distance education institutions.

A. Experiences of Some Developing Member Countries

With the development of TV network in China, TV. universities were established in 1960 in big cities such as Beijing, Shanghai and Shenyang. With regard to costs, it has been stated that:[19]

> "Facts proved that distance education is an effective way of training various kinds of professional personnel at a lower cost. According to our rough statistics: To train a correspondence student of college level, 200-300 yuan is needed per year while to a student of three-year professional training in regular colleges 5,000 yuan is needed. To a student for professional training in TV universities, only one-third of that sum is needed."

The experience of Sri Lanka also indicates the low cost of the Open University of Sri Lanka.[20] Comparisons of the cost of educating a student in an Open University system with the cost of educating a student in a conventional university have led to the conclusion that education through the Open University is relatively less expensive, probably less than one-third of the conventional universities irrespective of the basis on which the comparison is made. The validity of this conclusion becomes clearer in the light of the fact that the Open University system is complementary to the conventional system of higher education and makes use of both men and material in the latter system.

The experience of the Republic of Korea shows a similar result. It is roughly estimated that the average cost of Korea Air and Correspondence University (KACU) is one-tenth of the average cost per student at the nation's conventional universities. This demonstrates that distance teaching at KACU has been significantly cost-effective.[21]

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[18] Chang, T. M., et. al., *Distance Learning: On the Design of an Open University*, London, Kluwer-Nijhoff Publishing, 1983, p. 133.

[19] *Distance Education of Higher Learning in China*. A draft paper presented at the UNESCO Workshop in Distance Education, Bangkok, August 1983, p. 4.

[20] The Ministry of Higher Education, *An Introduction to the Open University of Sri Lanka*, Colombo, The Ministry of Higher Education, 1980, p. 6.

[21] Correspondence with the Korea Air and Correspondence University

In 1979, an Evaluation Mission from the UK Overseas Development Administration visited Allama Iqbal Open University in connection with the phasing of further aid support. From its inquiry, the Mission was of the view that, "taking into account amortization of capital costs, salaries and other recurrent expenditure, together with student numbers, the AIOU would progressively show considerable cost advantages over other conventional institutions."[22]

An interesting comparison of the cost between AIOU and conventional universities is provided in Table 5.1. Using what information does exist and based on projected intakes for 1987–88 extrapolated from current enrollments, the costs for two levels of education are derived.

Table 5.1: Cost Comparison Between AIOU and Conventional Universities

	Conventional		
	AIOU	Institutions[a]	Difference
Intermediate	RS. 3930/–	RS. 5688/–	44.72%
B.A.	RS. 5240/–	RS. 7250/–	38.35%

[a] Based on estimated 1978 figures given in the Fifth Five-Year Plan, corrected for inflation (cautious) 25 per cent.

Source: Allama Iqbal Open University (AIOU): *The First Ten Years* (Islamabad, Pakistan: Printing, Packaging and Paper Converting Corporation, 1986) p. 52.

B. Thailand's Sukhothai Thammathirat Open University (STOU)

1. Institutional Cost Per Head by Discipline

Operating cost per head of selective-admission universities and open universities in Thailand are presented in Table 5.1. It can be seen from this table that open universities have a much lower average cost. It should be noted that the figures for open universities represent the average cost of STOU and Ramkhamhaeng University, the other open-admission university.

It should be noted that the figures in Table 5.1 represent only operation costs. Investment costs such as those for building programs, equipment and other infrastructure are not included. From this table it

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[22] Allama Iqbal Open University, *AIOU: The First Ten Years*, Islamabad, Pakistan: Printing, Packaging and Paper Converting Corporation, 1986, p. 51.

Table 5.2: Operating Cost Per Head From Government Budget and University Revenue of Restricted-Admission and Open Universities by Discipline, 1980

Discipline	Per Head (Baht)
Selective-Admission Universities	
1. Medical Science and Public Health	61,810.87
2. Agriculture, Forestry and Fishery	36,718.37
3. Fine Arts and Applied Arts	28,920.36
4. Architecture and Regional Planning	22,111.73
5. Education and Teacher Training	20,507.39
6. Engineering	20,306.83
7. Natural Science	19,778.15
8. Mass Communications and Documentation	18,308.84
9. Mathematics and Computer Science	16,633.22
10. Others	15,208.63
11. Business Administration and Commerce	14,942.07
12. Humanities	14,332.56
13. Social-Behavioral Science	13,435.97
14. Law	11,970.81
Open Universities (Ramkhamhaeng and STOU)	
1. Business Administration and Commerce	1,695.95
2. Natural Science	972.72
3. Education and Teacher Training	638.08
4. Social-Behavioral Science	591.84
5. Law	461.34
6. Humanities	305.36

Source: Ministry of University Affairs, *Research Report on Operating Cost Per Head* Fiscal Year 1980 (Bangkok, 1984), Table 4, p. 25.

is possible to see the effects of the economy of scale. The large number of students in the open universities helps to reduce the average cost.

A comparison of operating costs per head in the same discipline is provided in Table 5.3. It can be seen from this table that the average cost per head per year in the same discipline is much greater in selective-admission universities. Comparison between the two types of university system in the discipline varies from 2.13 per cent in Humanities to 11.35 per cent in Business Administration.

Table 5.3: Comparison of Operating Costs Per Head Between Selective-Admission Universities and Open Universities, 1980

Unit = Baht

Discipline	Type of University		Percentage
	Selective (1)	Open (2)	
1. Business Administration and Commerce	14,942.07	1,695.95	11.35
2. Natural Science	19,778.15	972.72	4.91
3. Education and Teacher Education	20,507.39	638.08	3.11
4. Social-Behavioral Science	13,435.39	591.84	4.40
5. Law	11,970.81	461.34	3.85
6. Humanities	14,332.56	305.36	2.13

2. Institutional Cost Per Head by Institution

The study by the National Education Commission on operating and capital costs of government universities and private colleges in 1982 reveals variation of average operating costs among institutions. A comparison of operating costs per head of government universities in 1982 with that of STOU in the same year is provided in Table 4.4. It can be seen from this table that the percentage varies. STOU's average cost is about one-fifth of the average cost per student at Thammasat University, about one-tenth of the average cost per student at Srinakarinwirot, Prasarn Mit Campus, and about one-fiftieth of the average cost at Mahidol, the medical university.

3. Cost Per Graduate

An interesting comparison is the cost per graduate. How much does the institutions spend to graduate one student? The answer is provided in Table 5.5. In this table, it should be noted that the adjusted cost is higher than the data in Table 5.4. For STOU, the assumption for adjusting is that the success rate in 50 per cent of the cohort (dropout = 50 per cent) and that the average number of years to complete a two-year degree program is three, a three-year program is four and five

Table 5.4: STOU Operating Cost Per Head As Percentage of Cost Per Head of Other Universities, 1982

Unit = Baht

Institution	Per Head in Other Universities (1)	STOU Per Head (2,341 Baht) As Percentage (2)
Khon Kaen	49,635	4.72
Chiang Mai	40,210	5.82
Prince of Songkhla	37,244	6.29
Kasetsart	24,683	9.48
Chulalongkorn	46,089	5.08
Thammasat	11,463	20.42
Mahidol	120,730	1.94
Srinakarinwirot, Prasarn Mit	25,999	9.00
Silpakorn	27,394	8.55
King Mongkut's Institute of Technology	27,230	8.60

Sources: (1) National Education Commission, *Research Report on Expenditures and Investment in Universities and Private Colleges* (Bangkok: National Education Commission, 1985), p. 113.
(2) Suna Sithilertpasit, Pensri Tipsuwankul and Thanachai Yomchinda, *Analysis of Expenditures, Sukhothai Thammathirat Open University, 1980-1983* (Mimeographed).

months, and a four-year program is six. The calculation shows that the average cost per graduate is lower in STOU than in other universities, similar to the operating cost per head.

4. Private Costs

We have classified private costs to be borne by students into two categories: (i) expenses for tuition fees and study materials; and (ii) other personal expenses. The study by the National Education Commission reveals variation of private costs among institutions. A comparison with STOU cost is provided in Table 5.6. From this table, it can be seen that:

(i) The private costs per student at STOU is not much different from other selective-admission universities. But compared with private colleges, the average cost for tuition and fees is very much lower;

(ii) Compared with government selective-admission universities, the average cost per student for books and study materials at STOU is

Table 5.5: STOU Operating Cost Per Graduate As Percentage of Cost Per Graduate in Other Universities, 1982

Unit = Baht

Institution	**Per Graduate Cost in Other Universities (1)**	**STOU Per Graduate (7,023 Baht) As Percentage (2)**
Khoan Kaen	61,276	11.46
Chiang Mai	46,186	15.21
Prince of Songkhla	46,791	15.01
Kasetsart	31,490	22.30
Chulalongkorn	53,532	13.12
Thammasat	12,790	54.91
Mahidol	145,064	4.84
Srinakarinwirot, Prasarn Mit	30,756	22.83
Silpakorn	33,686	20.85
King Mongkut's Institute of Technology	38,000	18.48

Sources: (1) National Education Commission, *Research Report on Expenditures and Investment in Universities and Private Colleges* (Bangkok: National Education Commission, 1985), p. 125.

(2) Suna Sithilertprasit, Pensri Tipsuwankul and Thanachai Yomchinda, *Analysis of Expenditures, Sukhothai Thammathirat Open University, 1980-1983* (Mimeographed).

lower, but higher than the average costs of many private colleges and universities; and

(iii) We can conclude from this comparison that the private costs of the students in the Open University is lower than conventional universities. Since the distance-teaching university provides home-based education, the students' personal expenses such as housing, travel, food, etc. are much less than those of the students at conventional universities. In the case of Thailand, STOU students spend less than 1,000 baht per year over their everyday living expenses while students at conventional universities spend not less than 10,000 baht per year; this is more than 10 times as much.

5. Opportunity Costs

Opportunity costs, as previously mentioned, are also minimal or non-existent because STOU students are working adults.

Table 5.6: STOU Private Cost Per Head As Percentage of Cost Per Head Of Other Universities, 1982

Unit = Baht

	Tuition and Fees		Books and Materials	
	Per Head in Other Universities (1)	STOU Per Head as % (2)	Per Head in Other Universities (1)	STOU Per Head as % (2)
Government Institutions				
Khon Kaen	1,415	87.49	1,224	76.63
Chiang Mai	1,511	81.93	1,576	59.52
Prince of Songkhla	1,157	107.00	1,402	66.90
Kasetsart	1,115	111.03	1,651	56.81
Chulalongkorn	1,838	67.36	2,201	42.62
Thammasat	1,611	76.85	844	111.14
Mahidol	1,365	90.70	2,064	45.45
Srinakarinwirot, Prasarn Mit	1,133	109.27	1,402	66.90
Silpakorn	1,237	100.08	3,038	30.88
King Mongkut's Institute of Technology	2,279	54.32	3,824	24.53
Private Institutions				
Krirk Institute	7,952	15.57	662	141.69
Payap University	9,582	12.92	759	123.58
Saengtham College	5,927	20.89	625	150.08
The University of the Thai Chamber of Commerce	6,697	18.49	717	130.82
Bangkok University	6,802	18.20	1,054	88.99
Siam Technical University	7,578	16.34	629	149.13
Durakijpundit University	8,475	14.61	823	113.97
Assumption Business Administration College	9,658	12.82	1,676	55.97

Sources: (1) National Education Commission, *Research Report on Expenditures and Investment in Universities and Private Colleges* (Bangkok: National Education Commission, 1985), p. 146.

(2) Based on our own calculation.

C. Other Countries

In the revised calculations of the Open University costs for 1973, Wagner has shown that the Open University in the United Kingdom has lower costs than conventional universities, as shown in Table 5.7.

Table 5.7: Open University and Conventional Universities Revised Average Cost 1973 at 1971 Prices

	Open University	Conventional University
A. Average recurrent cost per equivalent	£258	£960
B. Average recurrent cost including the imputed rental cost of capital per equivalent undergraduate	£272	£1,111
C. Average recurrent cost per graduate	£2,179 in 1973 £1,842 in the long run	£4,049–£4,801
D. Resource cost per equivalent undergraduate	£272 in minimum	£1,647–£1,947

Source: Leolic Wagner, "The Economics of the Open University Revisited" in David Sewart, Desmond Keegan and Borge Holmberg, eds., *Distance Education: International Perspective* (New York: St. Martin's Press, 1983), p. 380.

External programs offered by conventional institutions are also interesting. In studying the direct teaching cost of the Royal Melbourne Institute of Technology, Sharma compared the unit cost of internal and external programs of the Institutes. He concluded, "Distance education is again shown to be more economical to operate than the attending mode."[23] The comparison is provided in Table 5.8.

GUIDELINES FOR FINANCING DISTANCE EDUCATION

In making guidelines for financing distance education, we look into the components of costs, especially the capital investment and operating costs previously identified. For capital needs, there are three types of facilities for consideration: (i) existing private facilities; (ii) existing

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[23] Sharma, R. D. "The Economics of Distance Education in an Integrated Tertiary Education System" in Taylor, James C., Timmins, Judith A. and White, Vernon (eds.), *Challenges Facing Distance Education* Australia, Darling Downs Institute Press, 1984, p. 76.

Table 5.8: Direct Teaching Unit Cost for Royal Melbourne Institute of Technology, Internal and External Programs 1975–1980

($ per EFTS)

	Year	Internal	External
	1975	1,523.46	739.05
	1966	1,969.40	898.43
	1977	2,137.86	980.19
	1978	2,457.98	1,284.23
	1979	2,499.15	1,449.89
	1980	2,622.00	1,335.54
Mean	2,201.64	1,114.55	

Source: Sharma, R.D. "The Economics of Distance Education in an Integrated Tertiary Education System," *Challenges Facing Distance Education* Taylor, James C., Timmins, Judith A. and White, Vernon J., eds. (Australia: Darling Downs Institute Press, 1984), p. 76.

government facilities; and (iii) special facilities for the institution. For operating costs, we look into three components: training costs, personnel costs and material and media costs. From these categories, we will discuss guidelines as presented in Table 6.1.

A. Capital Investment

Before making capital investment, there should be an investigation of existing facilities. Private existing facilities such as local printers and local production facilities can be used at lower costs through rental arrangement.

Public existing facilities can be utilized to the maximum if appropriate arrangement is made. For example, public schools can be used as study centers on Saturday and Sunday without interrupting school operation. Radio broadcasting stations can be utilized in the similar fashion. The Government should invest to improve these facilities in connection with the establishment of the distance education institution.

There is a great need for capital investment in the production system. As the quality of distance education is related to the quality of media and materials produced, the investment in production facilities will enhance the quality of instruction. Therefore, sufficient investment in printshops, warehouses and production facilities are on the priority lists. There is no need to invest in classroom buildings.

Table 6.1: Resource Needs for Distance Education

			Instruction	
Administration	**Production**	**(Delivery)**	**Examination**	
Capital:				
(a) Existing Private Facilities	–	– Local Printers – Local Production Centers	– Local Hotels – Schools – Universities – Hospitals – Schools	
(b) Existing Goverment Facilities			– Universities – Post Office – Radio Station – TV Station – Hospitals	– Study Centers
(c) Special Facilities	– Computer	– Printshop – Warehouse – Production – Facilities	–	– Computer
Operation:				
(d) Training Costs	– Administration Skills	– Course Writer – Producer's – Technician's	– Tutor's Skill – Counsellor's Skills	– Examiner's Skill
(e) Remuneration	– Salaries	– Salaries	– Salaries	– Salaries
(f) Materials	– Administration Materials	– Production Materials	– Instruction Materials	– Examinations

B. Operating Costs

As the quality of media is the heart of the system, there is a need to invest in the professional development of those who are involved in material productions. These include course team writers, radio and TV producers, tutors and technicians.

Staff members of the distance education institution should be recruited from qualified people and salary incentive should be attractive.

Special consideration should be given to the procurement of good quality materials, especially those used for the preparation of self-instructional materials.

C. Sharing the Costs

Capital costs should be shouldered by the Government as these costs are long-term investment.

Personnel costs, especially salaries, should be mainly provided by the Government because only money from the government budget can be allocated as salaries for government officials.

As students in distance education are working adults and they directly benefit from the education provided, they should therefore shoulder the burden. Materials and recurrent expenses should be borne by students. The cost-sharing pattern is provided in Table 6.2.

Table 6.2: Pattern of Cost-Sharing in Distance Education

Costs	Bearers
Capital	
a. Existing Private Facilities	Private Contribution/Government
b. Existing Government Facilities	Government
c. Special Facilities	Government/Students
Operation	
d. Training Costs	Government/Students
e. Salaries	Government
f. Materials	Students
g. Recurrent	Students

LOAN SYSTEM FOR DISTANCE EDUCATION

As the quality of the media is an important aspect of distance education, loans should be acquired to improve the infrastructure which will contribute to the quality improvement of the media.

A. Institutional Loans for Capital Investment

Institutional loans should be introduced by the Government to improve the infrastructure that can be used for the public in general and for distance education in particular, such as loans for the installation or the improvement of the satellite or broadcasting facilities.

Institutional loans for distance education should only be used for the capital investment in production facilities such as printshops, warehouses, and radio and TV production centers.

B. Institutional Loans for Operation Costs

There is a need for institutional loans for staff development. As this area is in great need and the training is quite expensive because more often it is conducted outside the country, institutional loans will help to improve the quality of the media.

In distance education institution, there are more needs for research and development of the media and materials used. The findings from research and evaluation can be used as feedback to improve the system. Institutional loans for institutional research and development are one of the priorities.

C. Student Loans

There seems to be little need at this time for loans to students. Because students in distance education are mainly working adults, they are in the position to support themselves.

SUMMARY

In developing member countries (DMCs) of the Asian Development Bank, many countries have established distance education institutions. They are India, Indonesia, Pakistan, the People's Republic of China, the Republic of Korea, Sri Lanka and Thailand. Low costs and expanding educational opportunities seem to be the advantages of distance education.

There have been changes in policies of financing distance education. The change is from the dual mode, offering distance education in conventional universities, to the single mode, establishing an institution to offer only distance education. Another change is in the source of income. The shift is from the Government to the students. Student fees have become one of the major source for financing distance education.

The costs of distance education include institutional costs, private or personal costs of students, and opportunity costs. Institutional costs vary with the types of media used for distance teaching. The more media an institution uses, the higher the cost of distance education. Multimedia techniques cost more than single medium instruction.

Compared with conventional universities, institutional operating costs of the open universities are lower than those in conventional universities. This is true in the United Kingdom, Pakistan, the People's Republic of China, the Republic of Korea and Thailand. In Thailand, the average cost per graduate is lower than in the conventional universities.

It is recommended that before making capital investment, the distance education institution should utilize the existing facilities, both government and private, to the maximum capacity. In cooperation with other agencies, the Government should make capital investment for the improvement of production facilities in order to enhance the quality of instructional materials. Investment should also be made for staff development and also in the area of research and development of distance education.

Institutional loans should be provided to improve the infrastructure necessary for the establishment of distance education. Capital investment for production facilities and expenses for personnel training and research and development should be given high priorities. There seems to be little need for loans to students at this time.

PART III

SEMINAR RECOMMENDATIONS AND LIST OF PARTICIPANTS

RECOMMENDATIONS OF THE SEMINAR

ADB should provide member governments and others with a comprehensive survey of distance learning and its present stage of development in the form of:

- the publication of the Seminar proceedings; and
- the publication of the resource materials provided for Seminar participants.

Distance education applies to a wide spectrum of activities in formal and non-formal education from elementary to higher education and training. It can carry educational messages from the humanities to science courses, from elementary to higher education and training, and from technical to health care curricula. It is particularly appropriate to the enrichment and diversification of all education the removal of social inequality for work-oriented and in-service training. Arising from the working groups' reports and recommendations, it is recommended to *planners and implementers* that where the above needs are identified, distance education systems should be seriously investigated as a way of providing supplementary inputs or alternative means for satisfying these needs.

Quality/Evaluation

Quality control resulting from continuous monitoring and evaluation is of critical importance in distance education systems, and entails industrial as well as educational considerations. The initial quality of educational methodology and the instructional materials produced therefore are of paramount importance in efforts to enhance the effectiveness of the teaching-learning process and thereby facilitate the acceptance and the status of distance education.

Quality of Instruction

In order to both enhance the quality of existing instructional materials and maximize the benefits of an integrated multimedia approach, ADB, governments and institutions should provide counselling facilities and expand training activities for professional staff in distance education through distance education strategy. The orientation of top level administration in distance educational methodology is advised. Training should be aimed at increasing the availability of instructional design expertise and personnel in the Region. Such training would help develop support for the transfer of educational technology and encourage associated research and development at the country level.

Quality Control/Evaluation

In order to enhance the quality of all distance education subsystems (admission, curricular standards, production, delivery, assessment, performance of graduates, etc.) ADB, government and institutions should expand the emphasis on monitoring and evaluation by undertaking action research projects aimed at improving the efficiency and effectiveness of distance education.

Technology

The view was endorsed that certain media (e. g. print and radio) which are well-established in many parts of the Region still have a significant role to play in the future of distance education. It was also agreed that efforts should be made to encourage an integrated multimedia approach to distance education, using the emerging communications technologies (e. g. computer and satellite) wherever appropriate. The development of multimedia approaches should, however, be based on the rational allocation of available resources in the light of instructional design considerations.

Computer

In order to evaluate the extent to which computer-based education can contribute to the efficiency and effectiveness of distance education, ADB, governments and institution should support feasibility studies to identify optimum methods for producing and managing computer-based learning. For example, a feasibility study could be undertaken to define appropriate implementation staff associated with educational projects.

Satellite

In order to evaluate the extent to which geostationary satellite technology can contribute to the efficiency and effectiveness of distance education, ADB, governments and institutions should undertake a series of feasibility studies in the developing countries of the Asian and Pacific Region.

In order to evaluate the extent to which technologies, including geostationary satellites, can contribute to the efficiency and effectiveness of distance education, ADB, governments and institutions should undertake appropriate feasibility studies in countries of the Asian and Pacific Region.

ADB, governments, institutions and other agencies should examine the scope for upgrading technical capabilities of existing satellite systems to improve audio and video links and the expansion of satellite-based education systems and other national development activities in the region (e.g. interactive technologies) for the benefit of teachers and students.

ADB, governments and institutions should support the efforts of developing countries to: (i) secure appropriate frequencies for operating a geostationary satellite through the International Telecommunications Union; and (ii) safeguard the orbital positions needed for future geostationary satellites.

It is recommended that distance education is organized in such a way as to encourage cooperation rather than competition with existing systems and that it should be complementary, supplementary and supporting.

It is further recommended:

- that credit systems be adopted to maximize flexibility and enable free movement of students among various institutions; and
- that distance teaching strategies can supplement formal and non-formal education programs.

It was recognized that financial practices for educational provision vary widely among countries. However, it is recommended that:

- planners and implementers ensure that the cost to the students for fees, media, material and personal costs do not exceed a level that will deter students from taking advantage of distance education; and
- funding agencies include an examination in the pre-project planning phase of project proposals, particularly those concerned with education and training, as to the extent to which a distance learning approach has been investigated from the viewpoint of cost and effectiveness.

Taking into account the rapid growth and development of distance education systems within the region and to avoid unnecessary duplication of effort, there is a need for exploring the scope and means of sharing the information, experience, expertise, technologies and for significant training programs. This led to the following recommendations:

- Institutions, government and ADB and other international agencies should conduct a feasibility study to consider a possible joint venture aimed at setting up a regional training and dissemination center. Such an institute would provide technical assistance for research and development of distance education including pre-project planning studies.

- It is recommended that planners ensure that distance learning programs make optimal use of existing national resources in the form of buildings, subject experts and the like.
- It is further recommended that through the appropriate use of materials, staff and systems, students and trainees in the conventional system benefit from the distance education developments.

Training Needs

ADB, UNESCO and other international agencies could promote initiation of action for meeting the training needs of developing member countries in various aspects of distance education, including:

(i) System planning/management: training of planning and management personnel as well as those dealing with regional outreach centers;
(ii) Program planning: course design and curriculum development etc.;
(iii) Course development: instructional design and development of instructional materials;
(iv) Course production: production of radio/TV and non-broadcast materials, editing/layout and illustration/printing;
(v) Delivery system: face-to-face contact session, creation of study/resource centers, student guidance and counselling;
(vi) Support system: library development, and the like; and
(vii) Research and evaluation: monitoring, feedback and statistical service.

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